THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXI. No. 1809.] LONDON, JANUARY 11, 1898. [50TH YEAR. PRICE 6d.

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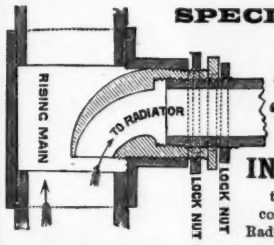

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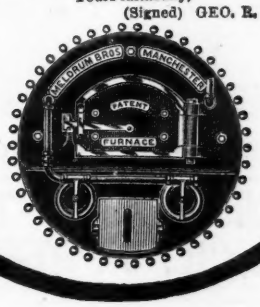

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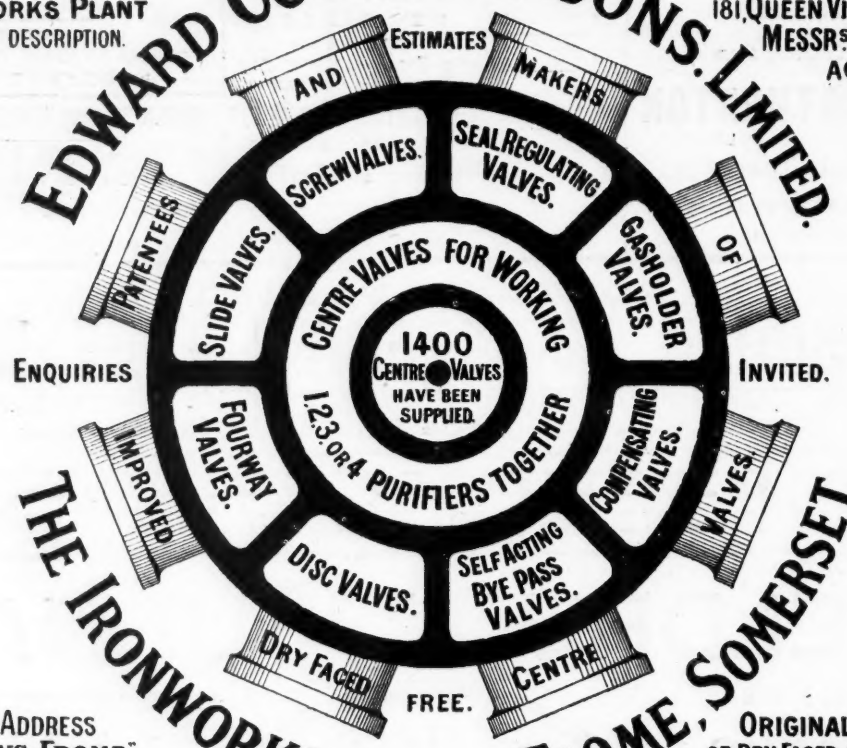

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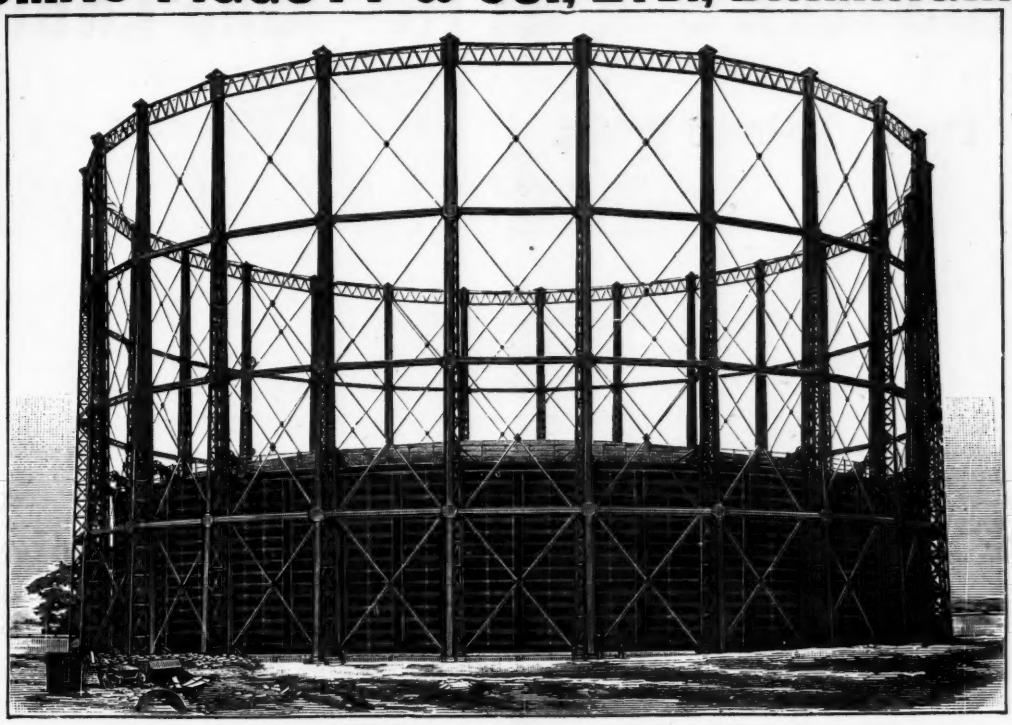

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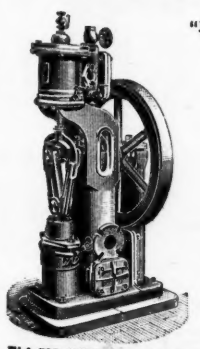

Fig. 705. "SINGLE RAM" STEAM-PUMP.

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

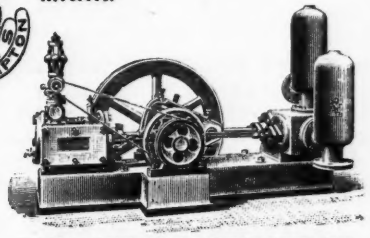

Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

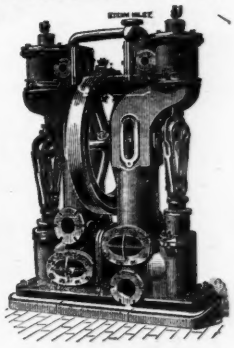

Fig. 712 "DOUBLE-RAM" STEAM-PUMP.

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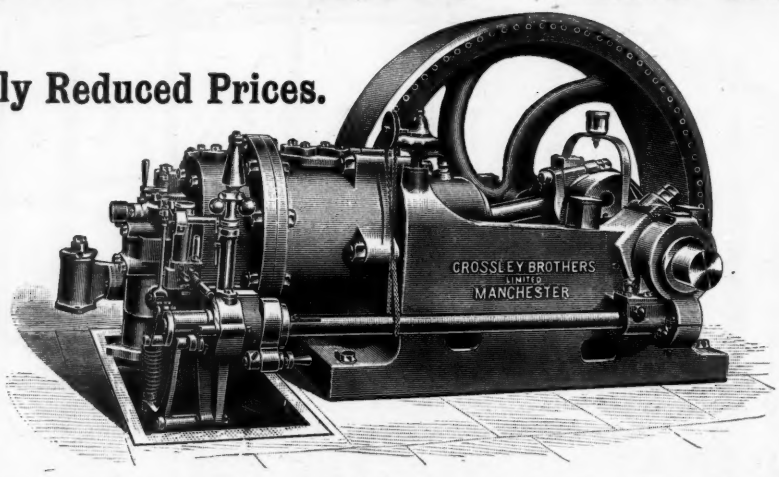

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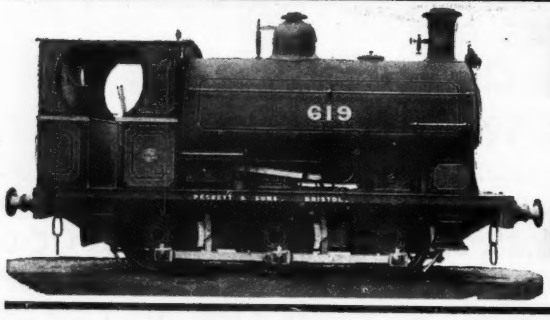

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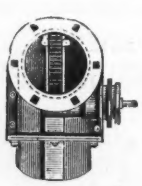

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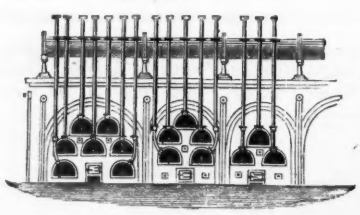

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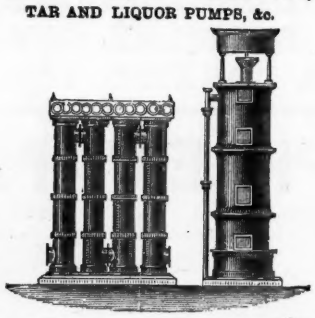

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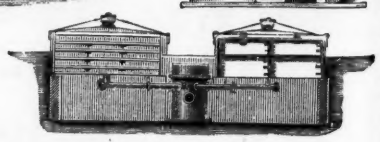

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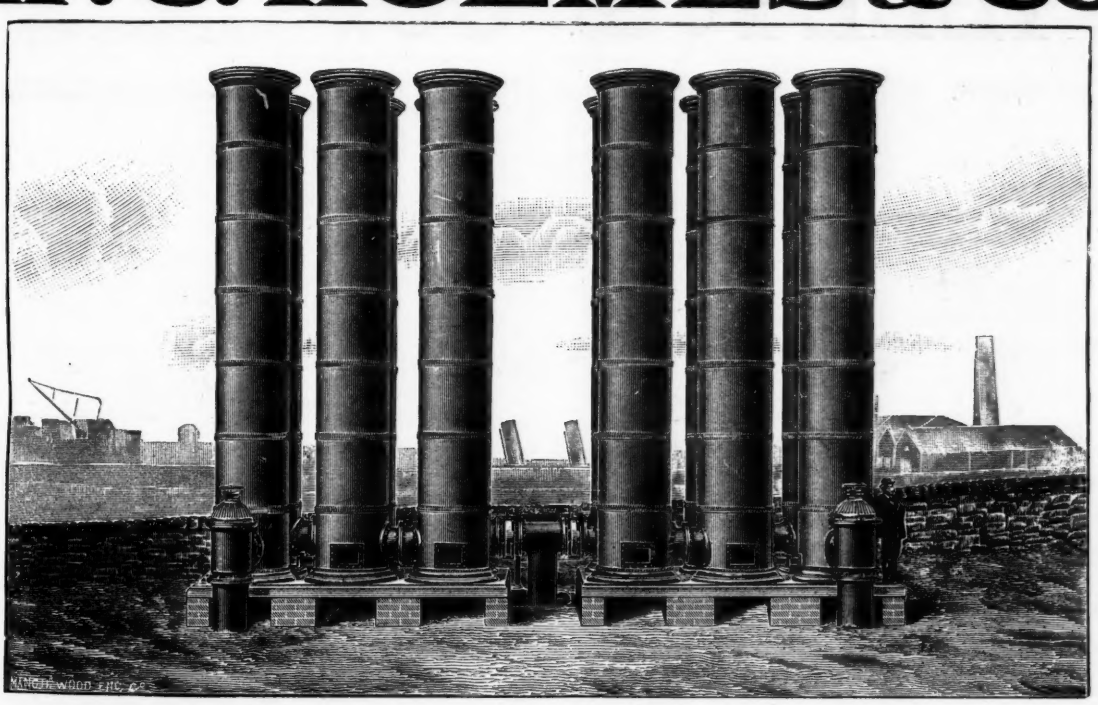

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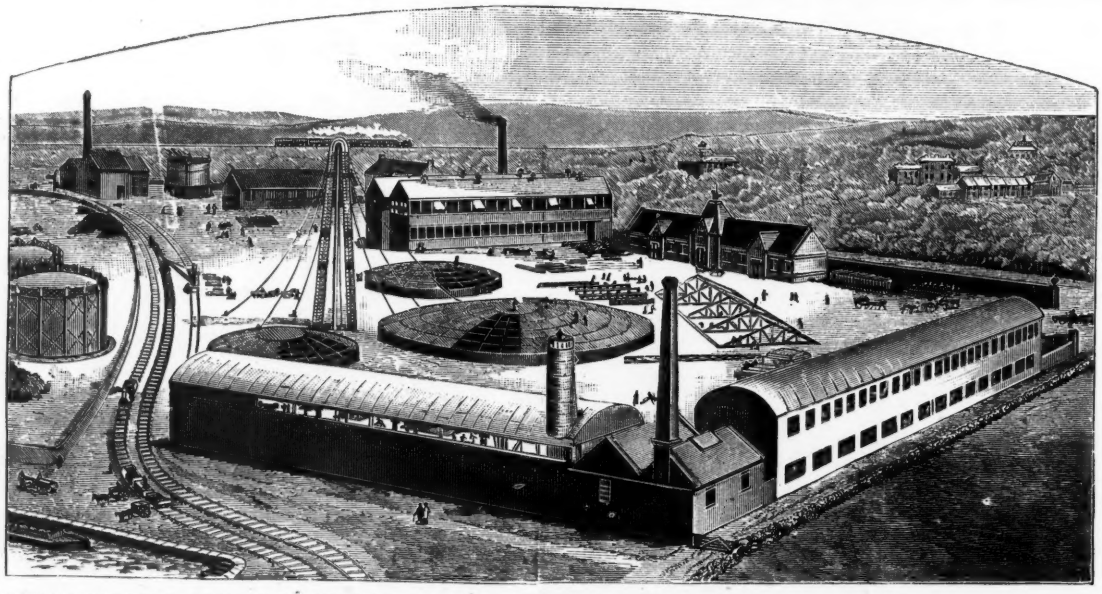

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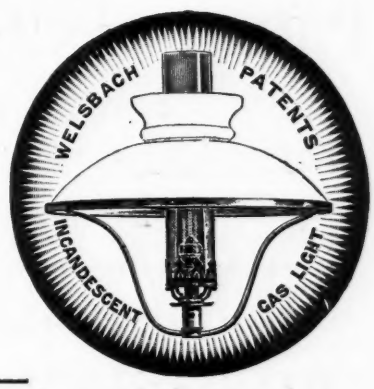

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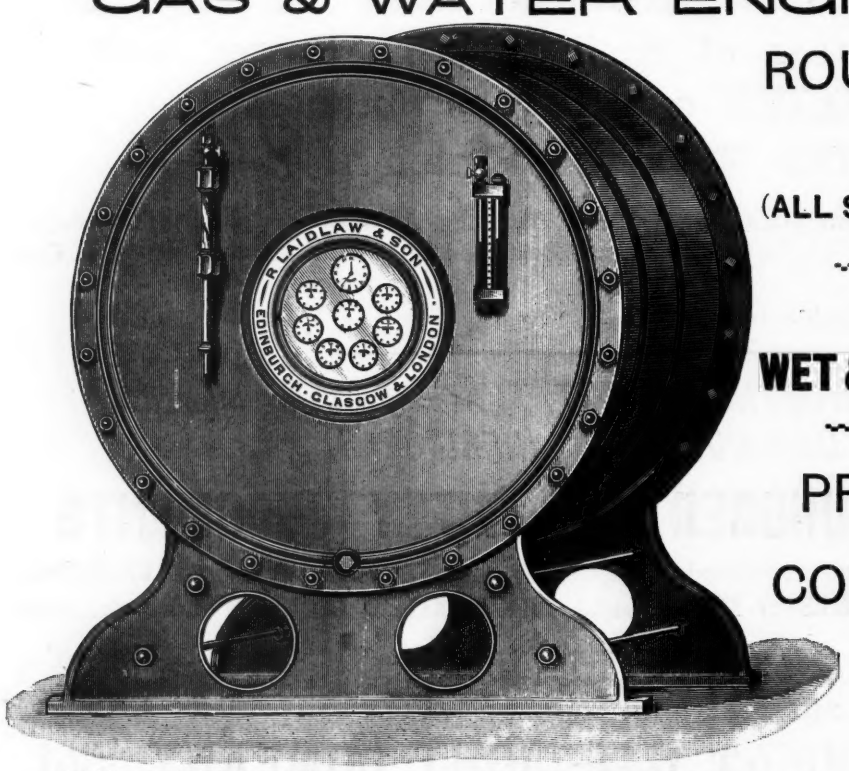

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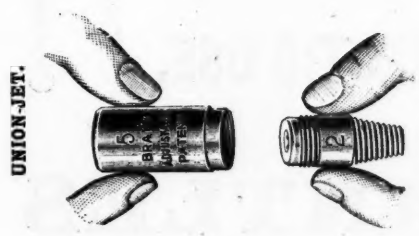

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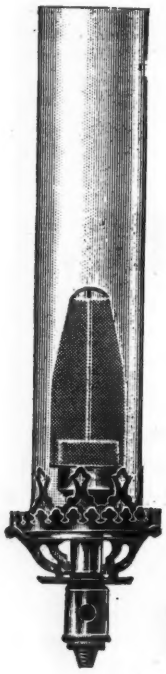

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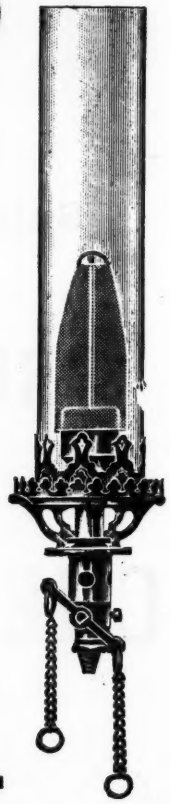

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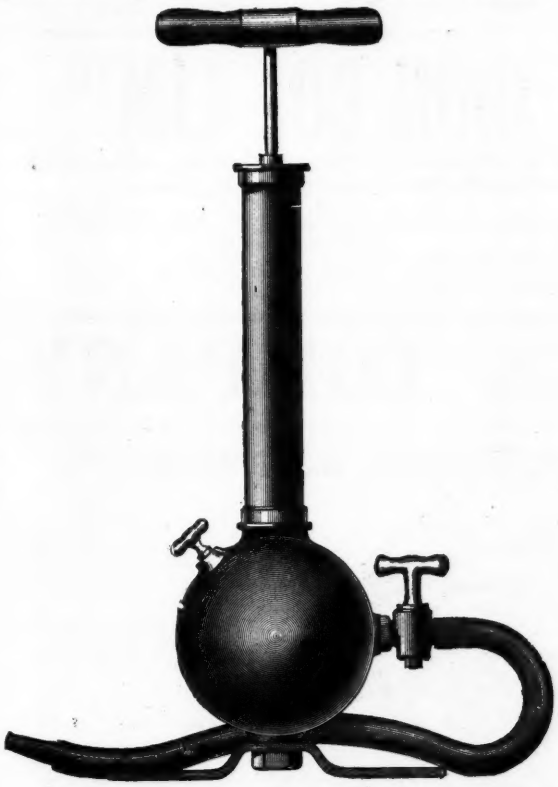

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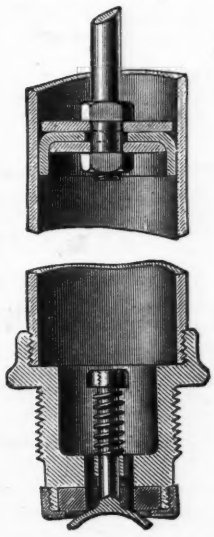

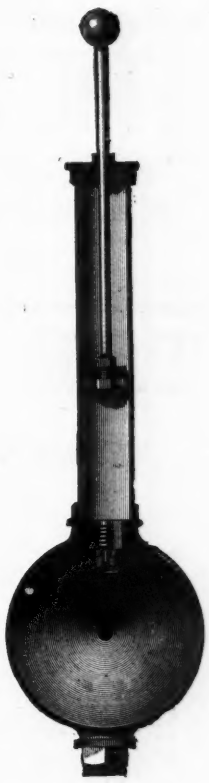

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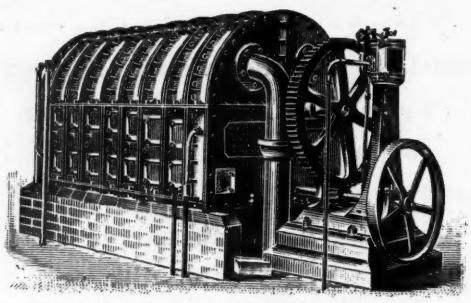

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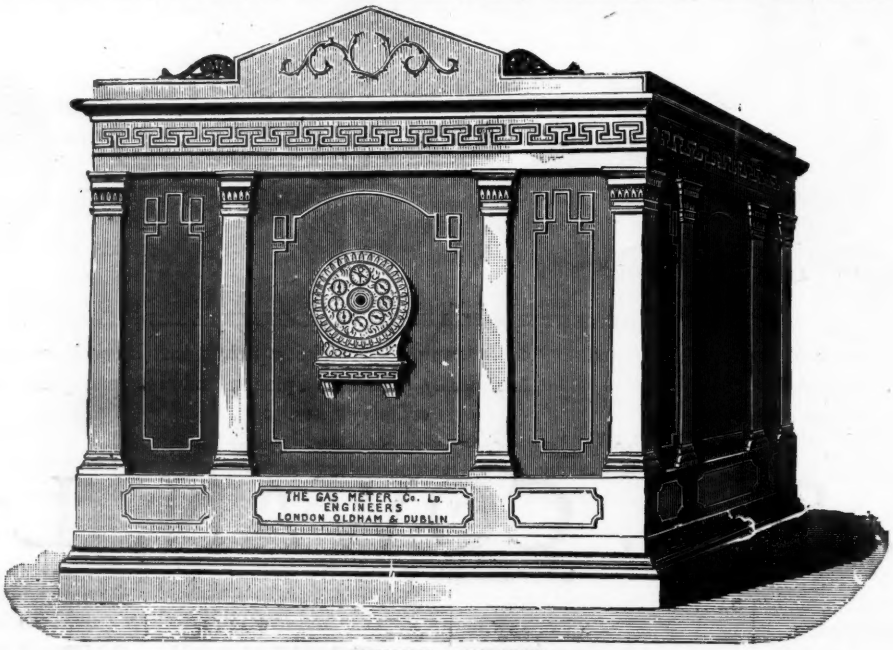

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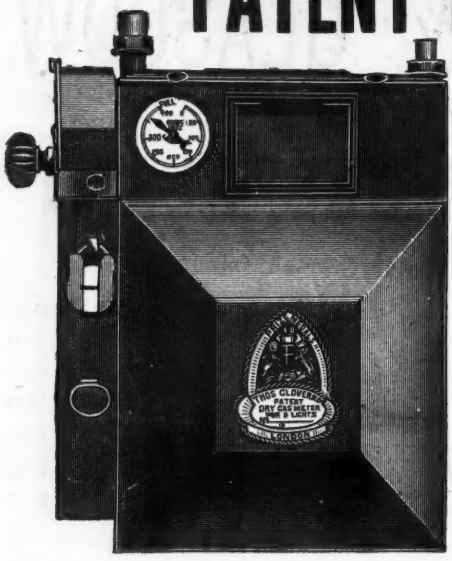

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EDITORIAL NOTES.

The Trouble of the Engineering Trade.

THOUGH there is absolutely nothing that can be called news to report this week with regard to the engineering trade dispute, yet the amount of newspaper space occupied with this matter shows no sign of such shrinkage as usually precedes the disappearance of a subject from the sphere of "practical politics." More lock-out notices have been posted; and the area of disturbance continues to spread. Last Saturday week, a National Conference of Trade Unionists, convened by the London Trades Council, was held to consider the state of the engineering industry. Several resolutions were passed calling for all sorts of aid for the engineers striking in the sacred cause of "collective "bargaining," and approving of a general weekly levy on all the Trade Unionists in the kingdom. Mr. Barnes very warmly applauded this suggestion, gloried in the amount of money alleged to be coming into the coffers of the A.S.E. from all parts of the world, and declared that the issue will turn entirely upon the question of money. Of course, this sort of thing is supposed to be all right and proper for the men to do; but the combination of employers to secure their share of the privilege of "collective "bargaining" is denounced as a conspiracy against the sacred cause of Trade Unionism. It would be an idle pretence to say that the men's leaders exhibit the smallest sign of recognizing the employers' right to meet combination with combination. While they remain blind to this consideration, it is obvious that no settlement of the trouble can be expected unless over their heads. When speaking in Lambeth on the 2nd inst., Mr. Barnes said "they were "going to continue this fight until the eight-hour day was "conceded. The Unions and the Employers' Federation "had started a nice little ball rolling, which would not "be stopped until an eight-hour day was granted to the "engineering trade, both in London and the Provinces." It is as well to know what the issue is; and here we have it. If the associated Trade Unionists are determined to fight the matter out, the employers must try which side is able to outstand the other, once for all. Because, as Mr. H. S. Maxim puts it in the December number of the "Engineering Magazine," the question of who is to be master must be decided, and there is no finality about the demand for an eight-hour day. "Suppose, for the sake of "argument, that the employers should grant a 48-hour "week with 53 hours' pay. There is not a single argument "employed by the labour agitators to prove that an eight-"hour day is preferable to a nine-hour day that could not "be used with equal force to prove that seven hours are "better than eight." Indeed, the socialistic Trade Union leaders themselves have made this important admission. It leaked out that the conference convened by the London Trades Council was in reality a lamentably poor affair—all the larger and more influential societies holding aloof. It was another "New Unionist" fizzle. The assertion was confidently made also that much of the money sent from abroad in aid of the strikers is contributed by Continental employers, who are well content to see the British engineering industry paralyzed.

Mr. George Livesey wrote to "The Times" on Thursday to contradict the assertion made in some quarters that if the strike should be crushed out unconditionally the relations between masters and men will be embittered thereby. He shows by the example of the Gas Workers' Union strikes that "wherever the Union has been defeated there "is peace, and wherever it is in power there are unrest "and discontent on the part of the men and anxiety on "the part of the management." A notable letter of Mr. Walter M'Dermott also appeared in "The Times" of Friday. The writer pointed out that "of late the advo-"cates of the masters' position have been so anxious to "avoid even the appearance of unfriendliness to Trade "Unionism in general, that they have credited it with a "great deal more of the present excellent position of the "working man than a proper consideration would justify." This is undoubtedly true. Mr. M'Dermott argues that the working man has prospered and the Trade Unions have flourished simply because the output per man in former years was constantly growing. "The leaders of "the Unions, taking all credit to their associations, have, "however, of late, directed their efforts to restricting the

"output per man; thus striking at the fundamental source "of their own past success."

An interesting, though not perhaps a very important, episode of the dispute is the electioneering proceedings at York, where Sir Christopher Furness, a member of the Employers' Federation, is standing as a Radical candidate for the seat vacated by the lamented death of Sir Frank Lockwood. It is a curious fact that there are among us a class of people—journalists and others—who cannot or will not understand any question of the day unless or until it becomes a matter of party politics; and then, of course, their understanding is governed by their party prejudices. Thus the "Daily News," as we have had occasion to remark, has been quite childish in its partisanship of the strikers. All that the men or their leaders did has been right and clever, and all that the employers have done has been wrong or stupid, to this newspaper. But now things have become a bit mixed; and when a Federated Employer who is likewise a good Radical is standing for York City, the "Daily News" is fain to argue that the gentleman's Radicalism, like the robe of Charity, covers everything else that he has about him. And Sir Christopher Furness has declared, like a man, that he is not going to desert the Federation because he is a candidate for a seat in Parliament. Whereupon Mr. John Burns, who has been very quiet of late, issues a "manifesto" to Trade Unionists of York, ordering them to vote for the Tory unless Sir Christopher promptly secedes from the Federation. This arbitrary behaviour on the part of Mr. Burns has done more to bring the "Daily News" to take a sensible view concerning the issues of the strike and lock-out, and the employers' methods, than anything that has previously happened in regard to the subject.

Gas Services and Electric Light Conduits.

An inquiry, interesting alike to gas companies and the electric lighting interest, has been held at Northampton in regard to a point arising out of the laying of electric lighting culverts. The local Electric Light Company wanted to lay down their culverts across the gas service-pipes in certain places, which necessitated lowering the pipes. The Gas Company objected; and as the parties could not arrive at a settlement of the dispute by agreement, an arbitration, under the auspices of the Board of Trade, was entered upon, with the result we record elsewhere. The Gas Company did not object for the sake of objecting, but showed that lowering the service-pipes would really mean lowering the mains also if the former were not to be exposed to the risk of becoming sealed. A local inquiry was held by Major-General A. de Courcy Scott, R.E., and his award deals fully and satisfactorily with the points at issue. It is designed to protect the interests of the Gas Company and their consumers; and, subject to this, it sets the Electric Light Company free to lay their culverts in their own way. The last comers are to pay all the expenses of making any alteration in the position of the service-pipes, which is only fair; and they are to compensate the Gas Company in the event of any fresh holes in mains being required. The two Companies are to bear their own arbitration expenses; and each pays one-half of the costs of the award. All this is perfectly fair and reasonable, and bears out the intention of the Electric Lighting Act that, wherever electricity supply undertakers come into collision with a gas company (the prior occupier of the subsoil), the former must not molest the latter. The award will be very useful in other places besides Northampton.

The Free Labour Protection Association.

The annual report of the Free Labour Protection Association has been forwarded to us; and it is gratifying to learn from this statement that the Association has achieved a fair measure of success. The Executive Committee of the Association is a very strong one; and its objects are those which all employers of labour and free workers themselves must have at heart. To state these objects in one word, it is "picketing" that has called the organization into existence. Notoriously, the strength of Trade Unionism lies in "striking;" and the life of strikes is the picketing system. Everybody knows what a difficulty has been created over and about the law of picketing. Legal in theory, this institution is nothing but pure terrorism in practice. Every strike is attended by picketing; and all picketing furnishes victims to the hospitals and hard cases to the Police Courts. Always and everywhere the Trade Union defends the pickets, right or wrong. The first problem set before the Free Labour Protection Association was how to meet this practical hardship on the employer and the free worker. A strike may occur at a place where the public authorities are without sufficient force for keeping the peace. The Association supplies the deficiency, and organizes a system of counter-picketing of the pickets, much to the disgust and inconvenience of the forces of militant Trade Unionism. In short, while the Federated Employers have been engaged in copying from and turning upon the Trade Unions the policy of "collective "bargaining," this Association has been taking a leaf out of the Trade Union book upon the subject of picketing. The experience has been in several instances distinctly humorous. As the first fruit of it, the Committee have had under consideration the terms of a Bill to check the abuse of picketing, which it is proposed to introduce into Parliament at the proper time, if necessary. "The "Committee have also arranged to hold special conferences "with the heads of the large industries, with a view to "the better statutory protection of the trade of the "country from the aggressive warfare which the 'New "'Unionism' has declared against capital, the end and aim "of which is the destruction of the employing and property-"owning classes, and the handing over of all the means "and instruments of wealth and production to a labour-"governed State." The Association does not lack a good programme.

Lord Wemyss, who is the President of the Association, has taken an early opportunity of supplementing the report with a letter dealing with a particular instance of the operation of the Association in regard to a strike of carpenters at Blackburn. The Association came to the rescue of the employers—supplying and defending a good number of non-union men, some of whom happened to be foreigners. This latter circumstance, of course, struck the Blackburn Trade Union carpenters as a most heinous crime; and the Branch Secretary wrote to Lord Wemyss to this effect. The obvious reply is that when workmen strike they must suffer the consequences. They undertake to bend the employer to their will; and he is free to avoid the necessity of doing so in any legal manner open to him. Among other resources, he is as much at liberty to employ foreign labour as strikers are to receive foreign subsidies in order to gain their own ends. The Association have set themselves to teach the Trade Unionists that their game is one that two can play at; and their pupils do not take very kindly to the lesson. Hitherto, though Trade Union members have been a minority in most trades, they have raised a clamour and exercised an influence altogether out of proportion to their numerical importance. This result has been due to several reasons which need not be gone into for the present; but organization was one of them. Neither the employers nor the free workers were organized; and accordingly the Trade Societies have often been able to make some headway by the application of the well-known principle of war: "Separate and conquer." Now that organization is being met by organization, picketing by picketing, levies in aid by mutual insurance, the case of the militant Trade Societies has entered on another phase, the end of which it is not easy to foresee from the point of view of either side.

Fox's Water-Gas Companies—Proposed Liquidation.

In last week's "Journal" we gave a full report of the melancholy proceedings at the last annual general meeting of the unfortunate shareholders in the Amalgamated Water-Gas Companies, Limited. We do not propose to comment upon the remarkable statements made by the Chairman, Mr. Samson Fox, in the course of his speech. The result of the meeting was an adjournment to the 31st inst.; after which steps will be taken to complete the dismal drama of Mr. Fox's water-gas schemes, with the equally lugubrious farce of a voluntary winding up. As Mr. Jerome's journal "To-Day" played such an heroic part in exposing Mr. Fox, it is due to it to acknowledge here the indebtedness of the investing public to Mr. Jerome for preventing Mr. Fox repeating with acetylene what he did only too effectually with water gas. Of course, we exposed both schemes at their respective times; but it is difficult for a purely technical journal to take the attention of the public, more especially if a powerful financial gang happens to be engaged in fabricating public opinion of another kind by the process known as "getting at the Press." As

with water gas and acetylene, so it is with the odds and ends of gas patents for burners and other matters which come before the public with a flutter of absolutely worthless "Press opinions" in their favour. The public are supposed to take such things on the recommendation of the "Horse Guards Sentinel" or the "Pall Mall Traveller;" and the wire-pullers are careful to keep expert opinion out of the way. That there has not, long ere this, been an acetylene boom, is due, not to the weakness of acetylene, but to the discrediting of Samson Fox which was effected at the expense of Mr. Jerome. The net result is that Fox takes a seat very far back, and the world is spared his further assistance in introducing additions to the appliances of modern civilization. If a man of his experience would only occupy his enforced leisure by writing a full and accurate autobiography, there would be as great a run on the book when it came out as ever there was for shares in a Cottam-Fox company.

Cost of the Public Lighting of Dublin.

A somewhat amusing variation is now being played to the time-worn quarrel of the Dublin Corporation and the Gas Company. The truce of exhaustion has of late ruled the mutual relations of the parties to this ancient and bitter feud. Even so in the old days the most antagonistic clans of the Celtic population could not always be fighting, and some of them might even join forces, in a manner, against a common enemy. Thus it happens that while the Dublin Corporation and the Gas Company are at peace, both are being attacked by a new foe in the shape of a big tramway combination which wants to get hold of the electric lighting of the city. This is now done after a fashion by the Corporation; and hitherto the enterprise has not been brilliantly successful. The Tramway Company are, for their own purposes, making the most of this absence of success. In some way, these powerful and enterprising speculators have gained control of a Dublin daily newspaper, which is made the medium of incessant attacks, not only upon the Corporation, but also, strange to say, upon the Gas Company, regarded as the allies of the Corporation in the matter of lighting. This is a new thing to be brought against the Company; but the really funny feature of the newspaper advocacy of the pretensions of the Tramway Company is its audacious and utter disregard of facts.

Only the other day, on the question of the reappointment of the Special Gas Committee being before the Corporation, the newspaper stated that among the members of the Paving and Lighting Committee which formerly had entire control of the public lighting "were several "of the Directors and shareholders of the Alliance and "Consumers' Gas Company, to whom the Corporation "pay close upon a quarter of a million of money annually "for gas supplied for public lighting." This statement might well have caused those who read it to open their eyes. Of course, in the ordinary way, denunciations of a gas company are best left unanswered; but this assertion was a good deal too much to stand in the way of misrepresentation. Accordingly, Mr. W. F. Cotton, the Secretary of the Company, wrote to the newspaper pointing out that there had been a little mistake, inasmuch as the Corporation payments for gas to the Company do not exceed £10,000 a year for all purposes. Some small discrepancy between this and the "quarter of a "million" named in the newspaper impeachment! The correction elicited a lame editorial correction to the effect that the statement "should have read to the effect that the "citizens as a body" pay the Gas Company the amount in question; but this is not true, as they pay their gas-rents individually, and the Corporation have no more to do with the individual gas bill than with the individual whisky score. On the other count, of the preponderating influence of the Gas Company on the Paving and Lighting Committee, Mr. Cotton was able to state with authority that "at the time referred to not one of the fifteen mem-"bers of the Committee was a shareholder" of the Gas Company. "There are only four members of the Corpo-"ration shareholders in the Company." More's the pity. The circumstance does not speak well for the status of the bulk of the Corporation in the financial circle of the Irish capital. The simple fact that such misrepresentation should be possible gives occasion for much reflection by no means complimentary to the newspaper press or its readers in the Irish capital.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 80.)

Although it was not to be expected that the Markets would get all at once into full swing, yet they have made a very fair start towards attaining the active character which the New Year was promised to induce. The tendency, too, was favourable; there being a decided demonstration of firmness, which showed considerable strength behind it. And so, without being exactly active, pretty well all descriptions have thriven, and prices are better nearly all round. The leading factors in influencing prices were the beginning of the end of the engineers' strike, which sent Home Rails up, and the prospect of a China loan, which rather watered the Consol market. The Money Market took the usual turn when the pinch at the end of a year is over—rates are relieved, and money is abundant. The Gas Market has not made much progress in getting into working swing, and was generally apathetic all the week, with just an occasional flicker of vitality, which promised better things, but soon died away. In this sort of state, any show of strength and buoyancy was not to be looked for; and the prices of one or two of the big issues are a little lower. On the other hand, some issues of lesser magnitude had an advance; so that numerically the gains and the losses are about on a balance. In Gaslights, the "A" opened unchanged; but after hanging on to about middle figures for a day or two, it fell back a point, and was marked on Friday as low as 313; but the final mark on Saturday was 314½. Only a few transactions were effected in the secured issues; all of them being strong and commanding firm figures. South Metropolitan was very moderately dealt in pretty well every day. But prices hardly varied at all, and gave no indication of a probable move either way. Commercials were not touched. The Suburban and Provincial division were nearly stagnant; but a deal in Brighton and Hove at top figures sent the quotation up a couple of points. Among the Continentals, Imperial was flat, and receded; but Union and European were steady. Of the rest, Monte Video had a moderate rise; but Buenos Ayres debentures were a point lower. Business in Water was rather more brisk, but died away to nothing later on. The general tendency was good. One or two stocks had a slight advance.

The daily operations were: The Gas Market was rather languid on Monday; hardly anything beyond a few deals in Gaslight "A" being done. Prices did not move. Tuesday was perhaps quieter still; and again quotations remained unchanged. Wednesday was dull and inactive; and Gaslight "A" and Imperial Continental receded 1 each. On Thursday, there was a faint show of a little more activity; but it did not amount to much. Brighton and Hove original rose 2. In Water, Southwark ordinary gained 1; and ditto "D" and New River, 2 each. Friday was dull. Imperial Continental fell 2, and Buenos Ayres debenture 1; but Monte Video moved up ½. There was as much doing on Saturday as on any other day; but prices did not undergo any change.

GAS BILLS FOR 1898.

According to custom, we to-day commence our usual abstract of the principal provisions of the Gas Bills deposited in the Private Bill Office of Parliament for the ensuing session.

The Clacton-on-Sea Gas and Water Bill is for the incorporation of a Company with a share capital of £120,000, whereof £30,000 is to be original and the remainder additional capital. Of the former, £20,000 is to carry a 10 per cent. dividend; and the balance, together with all the additional capital, is to bear a 7 per cent. dividend. Borrowing powers to the extent of one-fourth of the paid-up capital are asked for. The incorporated Company are to take over the property of a limited Company formed in 1875, and actually carrying on an undertaking in virtue of the terms of a Provisional Order of 1876. The gas limits are to include the urban district of Clacton and the parishes of Little Clacton and St. Osyth, in Essex. Clauses are inserted empowering the Company to refuse to supply persons indebted to them in regard to other property, and making consumers who quit premises without notice responsible for gas registered up to the next usual index-taking. The maximum price for 14-candle gas in Clacton is to be 6s. per 1000 cubic feet, and 7s. beyond. Interest at 4 per cent. will be paid on all consumers' deposits; and power is sought to supply gas in bulk.

The Drogheda Gas Bill is to incorporate the Drogheda Gaslight Company founded in 1839. The present share capital consists of £16,190; and there is no mortgage debt. The gas-works are upon leasehold land. The capital of the Company is to be £32,000, whereof the original capital of £16,190 is to bear an 8 per cent. dividend; and the balance is to be additional 7 per cent. capital. Permission to borrow to the usual extent is sought. Electric lighting powers are desired, but not so as to confer any priority of the right to supply electricity within the district of the Drogheda Corporation. The sliding scale is asked for, with the initial price of 4s. 6d. per 1000 cubic feet. Discounts

not exceeding 10 per cent. are to be allowable to consumers. Gas of 15-candle power is to be supplied, tested on the works. No penalty is to be incurred for defective supply in cases of unavoidable cause or accident.

The Frodingham Gas Bill is to incorporate a Company with a share capital of £18,000, with the usual borrowing powers, for the purpose of supplying gas in a district comprising the urban districts of Scunthorpe, Brumby, and Frodingham, in Lincolnshire. The Company are to acquire the gas-works of the Frodingham Iron and Steel Company, which supply part of the district. The sliding-scale is proposed, with 4s. 2d. as the initial price for 14-candle gas. No penalty is to be incurred by the Company for default in affording a supply of gas according to the terms of the Bill, where such default is due to an unavoidable cause, or was of so slight or unimportant a character as not materially to affect the value of the supply. It is provided that the want of sufficient funds is not to be held to be a circumstance beyond the control of the Company. Power is sought to apply for and carry out an Electric Lighting Order. The period of error in defective meters is to be limited to the current quarter. The Company desire to erect workmen's dwellings on their property.

The Haslemere District Water and Gas Bill is to incorporate a Company with a share capital of £36,000 and power to borrow £12,000, with the object of supplying with gas the parish of Haslemere, in Surrey, and of acquiring the undertaking of the Haslemere Gas Company, Limited. No person is to be disqualified as a director by being a member of any County, Urban, or Rural District Council within the limits of the Bill; "provided always that no member who is a director or shareholder or holder of debenture stock shall act or vote at any meeting of such Council on any question, or with reference to any matter, in which such director or shareholder has direct or indirect interest as a shareholder." The Company seek to include within their district certain areas over which the Godalming Gas Company possess unused statutory powers; but they are debarred from supplying gas within any district actually served by the Godalming Company. The undertaking of the Haslemere Company is to be purchased within six months, upon terms to be agreed upon or settled by an arbitrator. The maximum price of 14-candle gas is to be 5s. per 1000 cubic feet. There is to be no penalty in cases of "unavoidable cause or accident." Interest at 5 per cent. is to be allowed on consumers' deposits. A clause provides that meter registrations are to be *primâ facie* evidence of the quantity of gas consumed, any difference upon the point being referable to "a Court of Summary Jurisdiction, who may also order by which of the parties the costs of the proceedings before them shall be paid; and the decision of such Justices shall be final and binding on all parties." Clause 59 is as follows:—

> The Company's manager, or other person duly appointed for the purpose by the Company, may, between the hours of nine in the forenoon and four in the afternoon, enter any building or place supplied with water or gas by the Company, and inspect the meter, pipes, fittings, and apparatus for regulating the supply of water or gas, and see whether they are in good repair; and if such manager or other person at any such time be refused admittance into such premises for the purposes aforesaid, or be prevented from making such examination, the occupier of such premises shall, for every such offence, forfeit to the Company a sum not exceeding five pounds.

Another clause sets forth that before any person connects or disconnects a meter through which any of the water or gas supplied by the Company, is intended to be or has been registered, he is to give not less than 48 hours' notice in writing to the Company of his intention to do so. Any person offending against this enactment is for every such offence to be liable to a penalty not exceeding 40s. Again, injuring or tampering with the index of a meter is to be visited with a penalty of £5. Moreover, any damage caused to the Company by illegal acts is to be made good, irrespective of the special penalties.

The Reigate Gas Bill is to incorporate the old Reigate Gas Company, formed in 1838, and registered as a limited Company in 1863. The present capital consists of £20,000 of fully-paid stock; and there is no mortgage debt. The limits of supply are to be that portion of the borough of Reigate which is now supplied by the limited Company. The capital is to be £40,000, whereof one-half is the original capital, and the rest is to be 7 per cent. additional capital. The usual borrowing powers are desired. The sliding-scale is asked for, with 3s. 8d. per 1000 cubic feet as the initial price for 15-candle gas. Five per cent. interest is to be allowed on consumers' deposits. No unavoidable or accidental default in supply is to be penalized; but want of funds is not to be an excuse.

The Rhymney and Aber Valleys Gas and Water Bill is to incorporate a Company for the supply of gas in the district named, which is partly supplied by other undertakings whose property is to be acquired. The gas capital is to be £80,000, with the usual proportion of borrowed money. The maximum price of 15-candle gas is to be 5s. 6d. per 1000 cubic feet, tested at each of the works of the Company used as a separate source of supply. The gas undertaking of the Rhymney Valley Gas and Water Company is to be vested in the Company upon and from the passing of the Bill, in consideration of the allotment to the proprietors of the former Company of shares in the new Company to the nominal amount of £19,680. The undertaking of the Rhymney Gas Company, Limited, is also to be purchased on terms to be agreed upon or determined by arbitration. A like operation is to be carried out in respect of the undertakings of the Caerphilly Gaslight, Coke, and Water Company, Limited, and the New Tredegar Gas and Water Company, Limited. Contracts of some of these Companies with the Rhymney Iron Company are to be taken over.

The St. Anne's-on-the-Sea Gas Bill is for incorporating a Company formed in 1875, and sanctioned by a Provisional Order of 1876. The capital is to be £60,000, whereof £15,000 is to be the original, and the remainder the additional capital, with power to borrow to the extent of one-third of the amount. Authority is sought to make a subway under the Blackpool and Lytham branch of the Preston and Wyre Railway. The maximum price of 15-candle gas is to be 5s. per 1000 cubic feet. There is to be no penalty in case of non-supply from any unavoidable cause. Three per cent. interest is offered on consumers' deposits. Clauses 74 and 75 run as follows:—

> Every person intending to lay down or fix any pipes or other fittings for the distribution or supply of gas by the Company in any new building within the limits of this Act, and which are intended to be covered over, shall, before such pipes or fittings be covered over, give to the Company 24 hours' notice in writing specifying the situation of such building; and any officer of the Company duly appointed for that purpose may, before the expiration of such notice, enter such building between the hours of ten in the forenoon and four in the afternoon, and inspect such pipes and fittings, and may, by order in writing, prohibit any such as, by reason of improper arrangement, inferior workmanship, or insufficiency in size or material, will, in the opinion of such officer, be dangerous by allowing the escape of gas, or be insufficient to ensure a satisfactory supply of gas to such building; and if any person shall fail to give such notice as aforesaid, or shall refuse entry to such officer into such building within the time and for the purpose aforesaid, or shall prevent him from making such inspection, or shall not, to the reasonable satisfaction of such officer, make such alteration in the pipes and fittings as he may reasonably require, the Company shall not be bound to furnish to such person a supply of gas for such house, building, or premises: Provided that any person deeming himself aggrieved by any order made under this section may appeal to two Justices sitting in Petty Sessions within seven days after the date of the said order. Notice of the provisions of this section shall be given by advertisements published three times in each of three newspapers published in St. Anne's.
>
> Where any owner or occupier lets or sublets the premises of which he is owner or occupier for a period not exceeding three months, such owner or occupier may be required by the Company to pay the rents or sums due to the Company for gas, meter-rent, hire of meter, gas-stove, cooker, taps, fittings, or pipes due from the tenant or sub-tenant in like manner as if such owner or occupier had retained possession of such premises and not let or sublet the same.

To the clause making consumers leaving without notice responsible for the gas consumed up to the next taking of the meter it is appended that "notice of the provisions of this section shall be given on every demand note for gas-rent." Another clause gives authority for laying gas-mains in undedicated roads.

The Sheringham Gas and Water Bill is to dissolve the Sheringham (Norfolk) Gas and Water Company, Limited, and reincorporate the proprietors as a new Company. The limited Company was formed in 1887, and obtained an Order in the following year. The limits of supply are to be the parishes of Sheringham and Beeston Regis. The capital of the Company is to be £36,000, whereof £6000 is to be original, and £12,000 additional gas stock, carrying the usual borrowing powers.

The Stirling Gas Bill is to incorporate the Stirling Gaslight Company, formed by a contract of co-partnery in 1845. The original capital stock of the Company was £12,400, which was capable of augmentation to any amount; and the dividend was unlimited. The works were extended out of revenue until in March last it was decreed by the Sheriff of the Counties of Stirling, Dumbarton, and Clackmannan that the capital value of the undertaking amounted to £62,697. There was no loan capital. The capital of the Company is to be £59,544 original, and £10,000 additional 7 per cent. to be raised. Of the former amount, £29,772 is to be "A" 10 per cent. capital, and the remainder "B" 8 per cent. capital. The usual borrowing powers are asked for. Interest on consumers' deposits is to be at the rate of 2½ per cent. per annum on every sum of £2, subject to the right of the Company to set off the same against any money due to them from the consumer. The sliding-scale is asked for, with 4s. per 1000 cubic feet as the initial price of 20-candle gas. Discounts of 10 per cent. may be allowed to consumers. The testing-place is to be on the works, "or such other place or places as the Directors may determine."

The Whitwick and Coalville Gas Bill is to incorporate a Company formed in 1859 for the supply of the parishes named, in Leicestershire. The district is to be enlarged. The capital of the Company is to be £15,000, of which £8000 is to represent the share capital of the Company, £2000 is improvement capital paid up out of the revenue, and the rest is to be the additional capital. These classes of capital are to respectively take 10, 5, and 7 per cent. dividends. Power is sought to create a "renewal fund" by setting aside 1¾ per cent. per annum on the total capital, until the fund amounts to £2000. The usual borrowing powers are desired. Contracts with local authorities are not to disqualify directors or members of such local bodies. The sliding-scale is asked for, to operate half-yearly, with the initial price of 5s. per 1000 cubic feet for 15-candle gas. Within twelve months, a testing-place is to be provided on the works, "or within 200 yards from any part thereof." Discontinuing

consumers are to be liable for all gas registered up to and until the expiry of 24 hours from and after the receipt by the Company of a notice. Prepayment may be required from consumers in certain cases. Consumers' discounts to the extent of 20 per cent. may be allowed. A copy of the Act is to be delivered to the Registrar of Joint-Stock Companies.

PERSONAL.

Mr. W. RUXTON, who has been Assistant to Mr. R. S. Carlow at the Arbroath Gas-Works, has been appointed Manager of the Carnarvon Gas-Works, in succession to Mr. H. D. Duesbury, who has gone to Hoddesdon.

The Bradford City Council will to-day have before them a recommendation by the Gas Committee that Mr. CHARLES WOOD, the Deputy Gas Engineer, should succeed his father in the engineership; and there is no doubt the proposal will, as it deserves, meet with the approbation of all the members. The salary is to be £600 per annum. The Committee will also recommend that a Deputy Engineer be appointed at a commencing salary of £250.

OBITUARY.

Mr. CHARLES CLEMENTS, who, for the long period of 41 years, had been a Director of the Aylsham Gas Company, died on Christmas Day. He was 77 years of age, and had spent a most active and useful life in the town.

Ex-Alderman TARPEY, who was for many years a Director of the Alliance and Dublin Gas Company, died on the 4th inst., at an advanced age. He was a member of the Corporation from 1861 to 1886, and filled the office of Mayor in 1877.

Mr. ERNEST HART, the Editor of the "British Medical Journal," died at Brighton early last Friday morning, in his 62nd year. Deceased was an ophthalmic surgeon; but his life-work was in the field of journalism. He contributed a chapter on waterborne diseases to the "Twentieth Century Practice of Medicine," and was the author of reports on the influence of milk in spreading zymotic disease, on waterborne typhoid, &c., which have been recognized as of great value by Medical Officers of Health. Mr. Hart took an interest in all questions relating to sanitary improvement; and specially identified himself with the smoke abatement movement a few years ago.

We regret to record the death last Thursday, in his 75th year, of Sir W. H. WYATT, the Governor of the Chelsea Water Company. Deceased had not been long ill, for it may be remembered that he presided at the half-yearly meeting of the Company on the 16th ult., when he had the gratification of presenting, on behalf of the Board, a much more satisfactory account of the undertaking than they have ever been in a position to submit to the proprietors. Sir William was for some years Chairman of the West Middlesex Water Company; but he retired towards the close of 1896, and was succeeded by Mr. E. Boulnois, M.P. He was interested in other water and gas undertakings. He was Deputy-Lieutenant for Middlesex, and was knighted in 1876.

The Late Mrs. Chester.—The funeral of Mrs. Kate West Chester, wife of Mr. W. R. Chester, of Nottingham, whose sudden death on New Year's Eve was announced in the "JOURNAL" last week, took place on Wednesday, at the Church Cemetery, Nottingham. The first part of the service, which was choral, was held at St. Jude's Church, Mapperley Hill. The Rev. Canon Lewis and the Rev. Andrew Ping officiated; the former also taking the portion read at the grave. In addition to the principal mourners, a large number of friends attended to testify their sympathy with Mr. Chester and the family in their bereavement. Among those present were Mr. S. Moore, the General Manager of the Water Department, and the following principal officials of the Gas Department: Mr. S. Tagg (Radford works), Mr. H. E. Wharton (Basford works), Mr. H. Blakeley (Eastcroft works), Mr. W. A. Curry (Giltbrook works), Mr. J. Reeve (Inspector), Mr. Edwin Roe (Chief Clerk), and Mr. W. Garton (Accountant).

Weights and Measures.—A report by the Board of Trade on their proceedings and business under the Weights and Measures Acts, 1878 and 1889, since their previous report (dated Aug. 13, 1896) has lately been issued. It states that local standard weights, measures, and weighing instruments were verified or re-verified by the Standards Department during the period covered, as follows: Weights, 4431; measures of capacity, 520; measures of length, 69; weighing instruments, 652—total, 5672. In addition, 772 weights, measures, &c., were verified for the use of Government Departments. Gas-measuring instruments were verified for sixteen Gas Companies, seventeen Provincial Corporations, the Corporation of London, and the London County Council. During the past session, a Bill was passed to legalize the use in trade of weights and measures of the metric system; and appended to the report is a table of new equivalents in terms of the Imperial weights and measures, based on comparisons made by the Comité International des Poids et Mesures, Paris, and the Standards Department.

COMMUNICATED ARTICLE.

BOTH SIDES OF THE LEDGER.

By NORTON H. HUMPHRYS, Assoc.M.Inst.C.E., F.C.S.

(*Concluded from p.* 23.)

Another fallacy of a similar kind is the popular idea respecting the charge for rent of meter. This, like the differential rate, has been resisted on all sides. The consumers' representatives have fought against it; and if successful, they have imagined that they have actually secured for each and every consumer a saving represented by the charge for meter-rent. "Consumers'" managers have taken credit by introducing such a boon, and shareholders have consented to abolition of meter-rents under the idea that they were actually granting a concession. The general view of the question appears to follow the line of thought taken up by the consumer who recently wrote to "The Times," and said he did not object to pay his gas bill, but he did demur to pay the gas company's parish rates. This gentleman had simply been reminded of a truism—viz., that the consumers, and not the company, pay the rates. The rates are an item on the expenditure side of the revenue account, just like coal or labour; and the revenue account is, as already remarked, a concrete ledger account with the customers. The profit and loss account may be regarded as the ledger account with the shareholders; but this distinction is not observed in practice. The effect is that if the rate is increased, or if the company are put to legal expenses in defending their rights in the matter of assessment, the charge against the consumers is increased to a corresponding extent. The profit and loss account is not affected at all. So it is with the meter-rents. Where these are charged, the amount received appears as a special item to the credit of the consumers, and as such it goes to reduce the expenditure. When the meter-rent is abolished, the expenses of repair and maintenance, &c., remain as before. There is no alteration on the expenditure side. The only change is the merging of the income received for meter-rents with that for gas. If it was possible to annihilate the cost, or to put them in the profit and loss account as a special charge on the amount set aside for payment of full dividends, then the consumers would be actually relieved. The consumers continue to pay for the maintenance and renewal of meters, but with this distinction—that the charge per consumer now becomes a charge per 1000 cubic feet of gas. Assume, for the sake of argument, that it figures out at ½d. per 1000 cubic feet. Next take the case of two consumers, each furnished with a 5-light meter, for which they pay 2s. per year rent. The meter-rents are abolished, and the consumers fondly imagine that they have saved this 2s. But, as a matter of fact, they still pay the meter-rent, only it is at the rate of ½d. per 1000 cubic feet of gas consumed, instead of 6d. per quarter. The one may use only 2000 cubic feet of gas in the course of the year; and he pays 1d. per annum meter-rent. The other, however, may burn 80,000 cubic feet, in which case he now has the privilege of paying 3s. 4d. per year meter-rent. The point is illustrated in a more exaggerated form by the prepayment system. An extra charge per 1000 cubic feet is put on the gas to cover the cost of fittings, stove, meter, &c., with the effect that one consumer taking only 5000 cubic feet per annum gets the same thing for (say) 3s. 9d., as his neighbour who takes 25,000 cubic feet per annum pays 18s. 9d. for. This illustrates, in a more pointed manner than is possible under the usual regimen, the fact that, whereas with a charge per consumer there is a known sum to pay, with the charge per 1000 cubic feet the actual payment is variable, and the large consumer has to pay more than the small. The abolishment of meter-rents is not a step in the direction of justice as between one customer and another, but quite the other way. The fault of the meter-rent is that it did not go far enough. It was necessarily kept down to bare cost, as otherwise the consumer would soon find out that it paid him best to buy his meter, or, as has actually been done, private firms would step in and supply meters on hire in competition with the gas company. There should be a fixed charge to each customer, according to the size of the service-pipe, covering not only the cost of renewing and maintaining the meter, but also that of the service-pipe, a *pro ratâ* proportion of the unaccounted-for gas, with office and establishment charges that are dependent upon the number of customers. By this means the small consumer would be made to pay his own footing (which he does not do under present arrangements), and the initial price of gas would be reduced. There would be a nearer approach to justice as between the consumers; and the cheaper price would assist the development and security of the business.

We have seen, then, that the revenue account of a gas company shows the aggregate ledger account with the consumers; and that *averages* per ton of coal carbonized, per 1000 cubic feet of gas sold, and per consumer can readily be taken out, but that these averages are not necessarily applicable to any and every particular case. We can readily find out the exact sum received from any one customer; but the amount laid out on his behalf is by no means so definite. The manufacturing charges for coal, wages, purifying materials, and repairs have a fairly

intimate relation to the quantity of gas sold. Up to a certain limit, they are influenced by the magnitude of the operations. Large parcels of coal can be purchased at more favourable rates than small ones; purification is cheaper on the large than on the small scale; and the larger the rate of production the greater the margin for the introduction of generator furnaces, mechanical stokers, transporting machinery, and other devices for cheapening first cost. Given a works already established, and making 50 million cubic feet of gas per annum, the cost of increasing the output to 100 millions will be less than double the present manufacturing charges. It has therefore been found that a judicious reduction in price has not injured the profits, but has increased them by fostering the demand—that a large reduction to users of gas-engines or some other special line has not injured the other customers but, on the contrary, has benefited them by hastening the day when an all-round reduction in price can be made.

Sudden fluctuations in demand have a marked effect on the manufacturing charges, necessitating either forcing the retorts or maintaining a number of them under intermittent use, or perhaps calling for a larger proportion of storage capacity than would otherwise be necessary. It is also evident that the proportion between the maximum daily or weekly consumption, as compared with the total annual output, is an important factor. Yet approximately it may be said that the manufacturing charges are proportional to the quantity sent out, and that each consumer is chargable with a share in accordance with the quantity of gas he burns. The distribution charges, however, have a very slight connection with the actual quantity consumed, but a closer one with the number of consumers and their average distance from the works. The plant must, of course, be capable of meeting the maximum demand; but granting this, such questions as the mileage of main and the number of services and meters are the ones that actually determine the distribution charges. In any case, there is what one may call an enormous waste of working capacity. Several lengths of pipe are practically idle from one year's end to the other. Of the majority, but few are employed to anything approaching their full capabilities for more than a comparatively few hours in the year. The main or service leading up to a church is idle all the week, and that to a factory may be doing nothing during the summer. What would be the effect, as regards the cost of distribution per 1000 cubic feet of gas, if the mains and services were passing gas at their full capacity throughout the year? The cost of distribution would be insignificant. The fact that this item varies as between one consumer and another, has been recognized by the common practice of charging a higher price to outlying townships. It has already been observed that a proportion of the establishment charges will be affected more by the number of meters on the books than by the quantity of gas sold. The amount required to pay dividend, as well as some part of the establishment charges, turns rather upon the amount of capital invested than on the extent of business done; and the proportion between capital invested and annual income, is influenced by the maximum demand at any one time. The plant must be equal to meeting the Christmas demand, even if no business at all is done in the summer.

Further, in assessing the cost of the consumer, regard must be had to his relation to the whole. Apart from the questions of periods of inaction, maximum supply, &c., which are influenced by his peculiar characteristics, there are other matters affecting his cost—such as his distance from other customers, and the time at which he takes his maximum supply. A customer half a mile away from his nearest neighbour stands on a very different footing as regards distributing and establishment charges, from one situated in the midst of a closely inhabited district. It is possible that these charges may run so high as to render him an absolute loss to the concern, instead of a source of profit. If he takes his maximum supply just at Christmas, when the majority are also taking theirs, and has long periods of inaction during the light season, he practically takes a corner in the manufacturing and distributing plant for his own especial use, and is therefore rightly chargable with the cost of maintaining the corner throughout the year. Or perhaps he may want his maximum at a time when no one else does, requiring a special pressure to be put on for him, which means an increase of distributing charges in the shape of more unaccounted-for gas. Summer consumption is a good thing. If a fair proportion of cooking-stoves can be used—say, one to every four consumers—extra pressure can be put on; and there is a good margin left for profit. But if there is only one stove to every forty customers, it is possible that the result of putting on the extra pressure is a loss instead of a gain. This inter-dependence, however, is not so marked as compared with the characteristic features of each customer, as to constitute an argument in favour of uniform rates.

The disposition to generalize, as shown in the disposition to assume that the *average* cost is the real cost, is also evidenced in a tendency to accept the circumstances of one works as representing those of others. They may be, but are not necessarily so. A scheme of differential rates that fits perfectly fairly to the circumstances of one company, may be unjust and inexpedient when applied to those of another. It is quite possible to use the results of previous experience in other places as a guide, and they may prove a valuable assistance; but they must be applied with judgment and consideration, having due regard to special local circumstances. The object in view is not only to develop and retain a connection, but also to improve and consolidate the affairs; and special steps may sometimes be both just and expedient to this end, that would not be applicable in a general way. When a marked departure is made from the general custom, there is a disposition to condemn it as unjust or wrong, without taking the pains to inquire particularly as to its merits or otherwise. But it may prove an advance, and not a retrograde step.

The electric light companies, with the benefit of past experience gained by gas undertakings in view, do not attempt to do business on an unrestricted uniform rate system. In fact, they could not do so. The ratio between capital expended and income from sale of gas is usually less than 4 to 1. As applied to electric light companies, the ratio is at least double; and there are concerns actually earning over 50 per cent. profit on their sales, but yet unable to pay more than a very small dividend. Referring to regulations for the supply of electricity, there is usually a minimum charge, a limited maximum consumption, and a differential rate. An attempt to follow these lines on the part of gas companies, would no doubt be received with a howl by the public, who in this as well as in other ways, have freely given to electricity a privilege that would be denied to gas. A combination of the differential rate with the maximum consumption, known as the "Brighton system," is finding increasing favour with electricians. It involves, in addition to the meter, an instrument for recording the maximum rate of consumption. The quantity consumed as shown by the meter, is debited first with an agreed quantity—say, one hour's maximum consumption daily, charged at the full price of 7d. per unit—and the remainder is charged at a very low price, perhaps 1½d. per unit. A premium is thus put upon extravagant consumption; and the regular user gets his supply at a price trending towards the lower figure. The sellers, on the one hand, are able to make a prominent feature of the low rate, to their own advantage. The minimum charge, which is usually fixed at the price of 20 units, which the consumer has to pay if he only takes 1 unit, is a recognition of the existence of a fixed cost per customer apart from his actual consumption. The limited maximum consumption recognizes the importance of that factor in the consumers' ledger account. Possibly a cynic may urge that the alteration is introdnced more from motives of expediency than from a desire to do absolute justice; but this has no bearing on the soundness or otherwise of the arguments advanced.

The existing arrangement may answer so long as gas undertakings are able to continue their present course of steady increase and development, free from really serious competition. But if their rivals should succeed in altering this state of things, and the demand for gas should decrease, the restrictions of an unlimited uniform rate, whether with or without the slight assistance of a small charge per customer in the form of meter-rent, would become a heavy burden. It should especially be remembered that competitors now enjoying limitations and differential rates are able to strike at the most profitable lines of their business, thus injuring them to an extent greater than that indicated by the actual loss of custom. Apart from this, however, I venture to think that the minimum and maximum restrictions and the differential rate present a nearer approach to absolute justice than the unrestricted uniform charge.

The Forthcoming Acetylene Exhibition.—A few months ago we announced that a project was on foot for holding an acetylene exhibition at Cannstatt in March or April this year. It appears that the decision is to hold it in Berlin.

Public Lighting by Acetylene.—The town of Totis in Hungary is reported to be the first to be publicly lighted by acetylene. But this is disputed; and a claim has been put forward for Alzonne (Aude), where the French Acetylene Gas Lighting Company of Paris have put up works. The mains extend to a length of nearly two miles, and from them 250 lamps are supplied.

Lighting a Hospital by Water Gas.—The use of uncarburetted water gas for lighting by incandescence, which has been persistently advocated by Dr. Hugo Strache (see "JOURNAL" for Oct. 26, 1897, p. 898), will this winter be put to practical trial in Vienna. It has been decided to light a considerable portion of the large general hospital in that city with water gas according to Dr. Strache's system; and if the experiment proves successful, the installation will be extended until the lighting and heating of the whole building is done by water gas. The hospital accommodates about 3000 inmates, and is at present lighted partly by coal gas on the incandescent system and partly by electricity. The water-gas installation in course of erection is for a make of 3½ million cubic feet per annum. It will be in one of the courts of the hospital, and will occupy a ground area of only 144 square yards. The Authorities were led to give water gas a trial mainly from motives of economy, though a higher degree of efficiency in the lighting of the building, and a lower development of heat and carbonic acid, are advantages which it is hoped will also be gained by the change. A pathological institute near the hospital and some adjacent street-lamps will also be lighted by water gas, according to a correspondent of the "Zeitschrift für Heizungs-, Luftungs- und Wasserleitungstechnik;" so that Dr. Strache's system will now be granted a fair trial on a practical working scale.

TECHNICAL RECORD.

THE UTILIZATION OF BLAST-FURNACE GASES IN GAS-ENGINES.

At a recent Meeting of the West of Scotland Iron and Steel Institute, a paper on the above-named question was read by Mr. W. GALBRAITH.

The author began by remarking that the subject he was about to bring before the members was by no means a new one, as two papers dealing with it had already been contributed to the "Proceedings" of the Institute. As, however, Wishaw was the first place where the utilization of blast-furnace gas had been carried out, he thought it would be interesting to give the results obtained during the past year or so. A few years ago a large portion of Glasgow was lighted by the waste gas from Messrs. Dixon's works—a system of illumination which was not paid for by the Corporation or appreciated by the inhabitants. Economical changes had, however, been effected in the utilization of this gas for heating the blast in pipes-stoves, and more recently in the regenerative fire-brick stoves, raising steam for the blowing-engines, and other purposes. Proceeding with his subject, Mr. Galbraith said:

If we assume that a furnace makes 300 tons of iron per week with a consumption of 36 cwt. of coal per ton of iron, and that the gas can be utilized on the basis of 4 cwt. of coal per horse power per hour, we get the figure 1797·6 as the horse power per hour which can be developed.

$$300 \times 1{\cdot}8 = 540 \text{ tons of coal per week.}$$
$$540 \div 168 \text{ (hours in week)} = 3{\cdot}21 \text{ tons per hour.}$$
$$2240 \times 3{\cdot}21 = 7190{\cdot}40 \div 4 = 1797{\cdot}6 \text{ h.p. per hour.}$$

I need only state this figure in order to show the enormous power which must still be left unused. It is Mr. B. H. Thwaite's scheme to utilize this gas by employing it in an internal igniting engine, commonly called a gas-engine, and transmitting the power electrically to motors placed throughout the works. I do not propose to go into the question of economies in this way; as that is a point which has been very ably dealt with by Mr. Dixon in the paper referred to. In any case, we enormously reduce the sources of loss of power by our present system—loss in raising steam in the boiler, in condensation between the boiler and the engine, in the engine itself, and in transmitting the power from the engine to the machine by means of shafting, ropes, &c. Surely, if it is an economical proceeding to first convert the coal into producer gas, and use it in the way described, it must be much more so to use the gas already formed. At all events, it has much to commend it.

The plant at Wishaw consists of one of the "Acme" Gas-Engine Company's engines, of 14 nominal horse power, and 30 brake horse power with Glasgow gas, with 12-inch cylinder and 20-inch stroke; a dynamo of the Elwell-Parker type; and the Thwaite plant. The latter consists of a small coke scrubber, a physical purifier, gasholder, small fan, &c. With this is supplied the electric current carrying the following lamps:—

	Candle Power.
10 arc lamps, each of 2000-candle power	20,000
72 incandescent lamps, each of 16-candle power	1152
11 " " " 32 " "	352
1 " " " 50 " "	50
Total	21,554

At present we simply use the power for lighting.

The average of ten analyses of the gas gives as a result the following:—

	Per Cent. by Volume.
Carbonic oxide	25·83
Carbonic acid	7·21
Hydrogen	4·55
Carburetted hydrogen (CH_4)	3·45
Nitrogen	58·96
	100·00

It is clear that the gas being different from, and much poorer in combustible gases than, ordinary retort gas, would not develop the same power in the gas-engine; and as the latter was, of course, designed to use retort gas, certain modifications of the engine had to be carried out. With the exception that the engine is somewhat overloaded, or rather that sufficient margin had not been allowed for the difference in the explosive power of the gases, these modifications (which were not of a serious character) proved entirely successful; and for many months the engine did its work with as little trouble as the steam-engine which it replaced. Later on, however, it just failed to do all the work required of it; due probably to late ignition or leakage, or some other cause. To remedy this, Professor Rowden introduced some modifications in the igniting arrangement. The following was an early result: The gasholder fell in five minutes 1 ft. 5 in. A foot of gasholder being equal to 78·54 cubic feet, the above result is equal to 1335·18 cubic feet of gas per hour. From the foregoing we get the following:—

$$\frac{\text{C (ampères)}}{90} \times \frac{\text{E (volts)}}{105} = \frac{9450}{746} = 12{\cdot}5 \text{ E.H.P.}$$

$$\frac{1335{\cdot}18}{12{\cdot}5 \text{ E.H.P.}} = \frac{107 \text{ c. ft. p. E.H.P. p. hour.}}{58 \text{ c. ft. p. lb. coal.}} = 1{\cdot}84 \text{ lbs. coal p. E.H.P. p. hour.}$$

With regard to the above factor (58 cubic feet of gas per pound of coal, or 130,000 cubic feet per ton), I get this by calculation from the coal—taking the fixed carbon as 58 per cent., and the limestone as used. The actual figure I get is 129,054 cubic feet.

As a commentary on this result, I may say that we have been determining the ammonia in the gas, and from a number of experiments we find that, taking 130,000 cubic feet, the figure agrees exactly with the actual production of sulphate of ammonia per ton of coal. I think it is quite certain, therefore, that the figure I have taken is about correct, and that it is certainly not less than 130,000 cubic feet.

The foregoing results we obtained quite frequently; and I now give more recent ones:—

Fall of gasholder in five minutes	2 feet.
Gas used per hour	1885 c. ft.
95·5 C × 105 E ÷ 746.	13·57 E.H.P.
Plus 3·71 B.H P.	3·08 "
	16·65 E.H.P.

$$\frac{1885}{16{\cdot}65} = 113{\cdot}2 \text{ c. ft. per E H.P.}$$

$$\frac{113{\cdot}2}{58} = 1{\cdot}95 \text{ lbs. of coal per E.H.P.}$$

The further utilization of the power developed from the gas-engine in this way in driving the blowing-engines, hoists, and subsidiary engines, is a very tempting subject, which perhaps I had better leave for the discussion. Its expediency might be doubted—that is to say, I think most people would hesitate before they decided to drive the blowing-engine with an electric motor, worked by the gas from the blast-furnaces themselves. Yet the motor for this purpose would be a very small affair when compared with what is done on the Continent and in the United States—as, for instance, at Niagara. Electric hoists, however, are not by any means unusual, and are a success; and the driving of drilling-machines, punches, saws, &c., is also being carried out successfully in this country.

Of course, there is always the possibility of selling the force to perhaps neighbouring works, either for lighting or for power. But this involves a fearful responsibility on the blast-furnace manager, as the furnaces must go on; and it presents an opportunity to the furnacemen, fillers, and others, for making themselves objectionable by striking and combining on all sorts of trivial questions.

With regard to the foregoing figure, it is by no means such an easy matter to calculate accurately the amount of gas per ton of coal, as we have to deal with the carbon other than fixed carbon. For instance, if we calculate from the fixed carbon, which will average about 47 per cent., this at 34 cwt. of coal per ton is equal to about 18 cwt. of coke, which is manifestly low. Besides, we have still to account for all the carbon in the volatile matter.

We have been determining the ammonia in the gases from the different furnaces, and we find that, taking the volume of gas as 130,000 cubic feet per ton, the result exactly agrees with the actual produce of ammonia. I attach considerable importance to this, because if we take less it means that we must be losing ammonia; and if we take a higher figure, that the determinations must be too low. These results from the gas-engine we verified repeatedly.

THE RECOVERY OF SULPHUR FROM SULPHURETTED HYDROGEN.

A paper on the above subject was read by Mr. F. J. R. Carulla at the last meeting of the Nottingham Section of the Society of Chemical Industry. The author described certain circumstances under which he had found that sulphur in the free state could be obtained in large quantities by bringing sulphuretted hydrogen into contact with heated sulphur dioxide, such as is produced in a pyrites kiln, whereby the sulphur from this gas is also released according to the equation—

$$2\,H_2S + SO_2 = 2\,H_2O + 3\,S$$

The sulphur which sublimes in the process can be collected in suitable chambers, as in the Claus method. By using the same amount of sulphuretted hydrogen, the author obtains about 50 per cent. more sulphur than is possible by the Claus process; the extra yield being derived from the sulphur dioxide. Specimens obtained in 1893 of the sulphur produced were exhibited; and to the eye they looked fairly pure. Mr. Carulla said he had been induced to bring the subject before the members as Messrs. Brock and Hurter had recently taken out a patent for a similar process, an abstract of which had appeared in the "Journal" of the Society. He explained that the object of his paper was in no way to institute any prior claim, but rather to show the great value that might attach to the invention, and to bear witness to the excellence of the patent and likely efficiency of the process. In the discussion upon the paper, Mr. L. Archbutt asked whether the use of the Claus kiln was a sure test of the process. It seemed to be so in the patent referred to. Mr. Adams said the requisite sulphur dioxide might be attained by first burning a portion of the sulphuretted hydrogen in air. Mr. Carulla, in reply, said there was some difficulty in carrying on experiments with these gases on the large scale, owing to the stringency of

the Alkali Acts. A process might be commercially successful, and yet owing to the necessity of complying with the Acts the further expense might make it a losing one. He was not aware that oxide of iron took any part in the reaction which he had described, though certainly Messrs. Brock and Hurter made use of the Claus kiln, in which case the oxide possibly did assist in the process. The suggestion of Mr. Adams, though ingenious, sacrificed the advantages of obtaining the extra yield of sulphur from otherwise worthless pyrites.

THE USE OF BREEZE AS BOILER FUEL.

The Kudlicz grate for the combustion of breeze and other fuel residues was fully described in the "JOURNAL" for July 13 last (p. 109), and drawings illustrating the customary patterns were given at the same time. Some of the earliest practical trials of this grate were made at the Nuremberg Gas-Works; and brief particulars of the work done were given in the "JOURNAL" for March 23, 1897 (p. 654), from details furnished by Herr J. Haymann, the Manager of the works. Since the date of these trials, exhaustive tests of the efficiency of the boiler furnace fitted with the Kudlicz grate have been made at Nuremberg by the Bavarian Boiler Association. Calorimetric tests of the fuel and ash were made by Dr. Bunte for the Association; and the results of the investigations have been communicated by Herr Haymann to a recent number of the "Journal für Gasbeleuchtung." Results of previous trials have necessarily been incomplete and inconclusive; and we therefore now give the more important details of the present thorough investigation.

In 403 days of 24 working hours, the furnace consumed 545 tons of breeze and 22 tons of brown coal or lignite. The brown coal was employed only when there was a special demand for steam. But if this kind only had been used, about 459 tons would have been consumed. Breeze was selling at 1s. 11½d. per ton, while for brown coal 11s. 2½d. was paid. Therefore a saving of nearly £200 was effected in 403 days by the use of breeze in place of the other fuel in one boiler furnace. The boiler on which the efficiency tests were made was of cylindrical pattern. The heating surface amounted to 430 square feet, and the Kudlicz grate, which was horizontal, had an area of 8·6 square feet; so that the ratio of heating surface to grate area was as 50:1. The boiler contained 2050 gallons of water; the steam space amounted to 85 cubic feet; and the highest permissible working pressure was 7 atmospheres. It had worked uninterruptedly for 1100 hours since it was last let down for cleaning; and the ash and fine fuel carried by the draught into the first flue had been removed therefrom two days prior to the trial. This cleansing of the flue passages ordinarily had to be performed at least once a week. The steam-blast was supplied, as a rule, from the boiler itself; but during the trial the steam for the blast was taken from another boiler. The boiler tested was used to work two steam-engines, three pumps, three steam-heaters, and a gasholder.

The tests were made over periods of 10·5 and 8·85 hours on two successive days. The feed water, the fuel, the ash, and the deposit in the first flue were weighed; but that in the two posterior passages of the flue was not determined. The fuel consisted of breeze varying in size from dust to granules 0·16 inch thick. It contained on an average 2·63 per cent. of moisture, 13·36 per cent. of ash, and 84·01 per cent. of combustible material. The latter had the following percentage composition: Carbon, 91·83; hydrogen, 2·38; oxygen and nitrogen, 4·49; sulphur, 1·30. The analytical data and calorimetric tests made with compressed oxygen in the Berthelot-Mahler bomb gave concordant results for the calorific value of the fuel. The mean was 6707 calories per kilogramme, which is equivalent to 12,072 British thermal units per pound of fuel. The ash from the grate contained only 24·58 per cent. of combustible material. The deposit of ash and fine fuel in the first flue contained 72·11 per cent. of combustible material, and had an average calorific value of 5493 calories per kilogramme, or 9888 British thermal units per pound. Observations were made every 15 minutes in regard to the pressure in the blast-box, the vacuum in the air uptake, the temperature of the feed water, of the air in front of the boilers, and of the flue gases at various places. The flue gases were continuously aspirated for determinations of carbonic acid and oxygen by an Orsat apparatus. The demand for steam was uninterrupted and tolerably uniform throughout the trials.

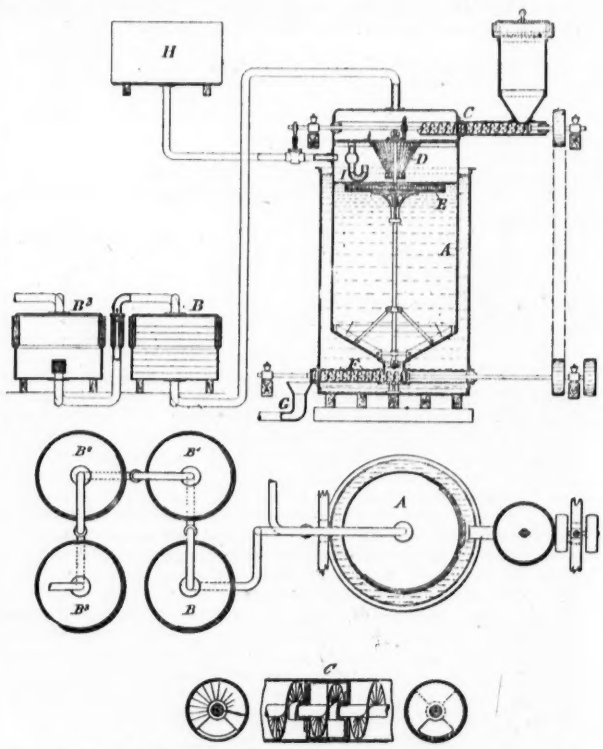
On an average, 15·15 lbs. of breeze were burnt per hour per square foot of grate area, and 1·71 lbs. of steam were used per hour per square foot of heating surface. With the layer of fuel rather less than 2 inches in depth, a pressure of 0·14 inch beneath the grate, and a vacuum of 0·45 inch at the end of the boiler, there was found in the flue gases aspirated in front of the damper 5·16 per cent. of carbonic acid. This percentage indicated that 3·32 times the volume of air theoretically necessary for combustion had been supplied to the furnace. The temperature of the flue gases was 490° Fahr. The quantity of water evaporated by 1 lb. of breeze was equivalent to 5·56 lbs. regarded as steam at 212° Fahr. from water at 32° Fahr. But if the steam required for the blast had been taken from the same boiler, the quantity remaining available would have been, on the same basis, only 5·03 lbs. per pound of breeze burnt. The ash from the grate amounted to 10·4 per cent. of the weight of breeze used, and the deposit in the first flue to a further 6·86 per cent. of the weight of the breeze. A calorific balance drawn from the data obtained in the trials showed that the efficiency of the boiler was only 52·5 per cent. of the theoretical maximum. The losses of heat expressed in percentages of the calorific value of the fuel were as follows: In ash from the grate, 3·0; in deposit in the first flue, 5·6; in chimney gases, &c., 33·8; and by radiation, conduction, in soot, &c., 5·1. The excessive quantity of air admitted to the grate clearly caused the chief part of the loss of efficiency. The losses by the chimney were of three kinds: (1) The usual loss, determined from the composition of the fuel, the percentage of carbonic acid in the chimney gases, and the difference in temperature between the latter and the ingoing air; (2) the superheating of the steam of the blast to the temperature of the chimney gases; (3) the evaporation by the fire of 10 per cent. of water in the steam issuing from the blast-pipe.

Notwithstanding the great loss of heat from these causes, the cost of producing steam proved to be very low, owing to the small value commercially of the breeze which served as the fuel. At the price of 1s. 11½d. per ton, the breeze consumed in producing 1000 lbs. of steam cost only 2·1d.; whereas the same quantity of steam produced by ordinary means in Nuremberg would have required fuel costing about 16d. In the opinion of the Bavarian Boiler Association, the efficiency of the installation might be increased; and primarily an attempt should be made to avert the great loss of heat by the chimney. A reduction of the excess of air might be secured by reducing the pressure of the blast, by more nearly closing the damper in the flue, and by working with a deeper layer of fuel on the grate. The Association suggested also certain alterations in the positions of the holes in the grate and of the air conduit. The steam-pipe for the blast also should be jacketed, and the air for combustion should be drawn from regenerative passages in the setting of the boiler instead of from the open. Judicious trials of such changes might result in a very great increase of efficiency. In the experiments reported, a large percentage of the heating value of the breeze was wasted; but nevertheless the cheapness of the fuel made the cost of steam incomparably lower than its cost by ordinary fuel without the aid of the Kudlicz grate.

REGISTER OF PATENTS.

Manufacture of Acetylene.—Hargreaves, A. J. de P., of Paris. No. 27,194; Nov. 30, 1896.

This method of manufacturing acetylene gas consists in feeding a regulated quantity of calcium carbide through a sieve-like receptacle or hopper, arranged over a body of water contained in a closed vessel or generator, to a revolving tray immersed a short distance beneath the surface of the water, removing a regulated quantity of the lime thrown down as the result of decomposition, and simultaneously introducing a regulated supply of fresh water to compensate for that which escapes with the gas or with the lime.



The illustration shows an elevation (partly in section) and a plan of the arrangement; also details of an "intercepting or controlling device" referred to later on.

The generator A consists of a hopper, preferably cylindrical, and having

a conical base; also a cover, made gas-tight, by means of a water-seal. In the hopper a quantity of calcium carbide is placed, proportioned to the volume of gas desired. To the base of the hopper is attached a tube, enclosing an endless revolving screw, capable of moving a determined quantity of the carbide at each revolution—the carbide being gradually conveyed by the screw to an intercepting or controlling device C, consisting of one fixed plate or disc of iron from which a segment is cut, and one revolving plate or disc from which a similar segment is cut; the latter being fast upon the shaft which carries the endless screw. A screw, having the same pitch as the endless screw, is mounted upon the shaft next to the latter plate; and the arrangement of fixed and revolving plates is repeated. The two fixed plates, the feed-screw, and the two revolving plates are so arranged that, when the segments of the first pair are open, thereby permitting the passage of the carbide, the other pair of discs is closed. Conversely, when the second pair of plates is open, the first pair of discs is closed, and the feed-screw between the two pairs of plates propels the carbide along the tube and through the opening in the second pair of plates to another endless screw, of like diameter and pitch, which revolves over a plate or trough inside the generator. The two sets of fixed and revolving plates, adapted for operation in conjunction with the feed-screw, are termed "obturators;" and the carbide, having passed these obturators, is conveyed, by an endless screw, to the centre of the generator, where it is deposited in the hopper D.

The generator is provided externally with a water-jacket; and it is filled with water up to within a few inches of the base of the hopper D. A few inches below the water-line is placed a revolving tray or disc E, secured to the vertical shaft; the periphery of the tray being furnished with a rim of wire-netting a few inches in height and of suitable mesh. The carbide conveyed to the hopper by the revolving screw passes partly through the apertures of the hopper, and partly through the base, and falls upon the revolving tray. Directly, impure acetylene gas, together with water vapour, is given off. These are together forced upwards through the base and apertures of the carbide-hopper D; and the watery vapour coming into contact with the carbide in the hopper, causes the liberation of fresh volumes of acetylene. All this acetylene, practically free from particles of water, passes into the space at the top of the generator, and is thence conveyed to the purifiers B, B^1, B^2, B^3. Meanwhile, the carbide which has fallen upon the revolving tray E, having given off all the acetylene which it contained, has become converted into lime. The centrifugal force generated by the rotary action of the tray propels this lime through the meshes of the wire-netting; and it slowly subsides through the water upon the conical base of the generator. The netting, however, prevents the escape of any portion of the carbide which has not been thoroughly disintegrated; and the rotary action at the same time expedites disintegration.

The lower extremity of the vertical shaft is fitted with curved arms or scrapers, which work against the inner surface of the conical bottom of the generator, in order to prevent the adhesion or accumulation of lime upon the surface of the generator. After being gathered towards the centre, the lime falls into a tube F, fitted with an endless screw of like diameter and pitch to that already described in connection with the feed mechanism, and which gradually removes the lime and conveys it to an obturator like that previously described. By these means, at each revolution of a screw mounted upon a shaft arranged at right angles to the vertical shaft and parallel to the feeding shaft, a certain quantity of lime and water is removed from the generator, and passed out through a channel G to a decanting tank, whence, the lime having been allowed to settle, the water may be drawn off and the lime collected.

By means of a cam attached to either of the horizontal shafts, and connected with a water reservoir H, a quantity of fresh water, equal in volume to that withdrawn at the bottom of the generator, is admitted at the top with each revolution of the horizontal shaft—thus maintaining the water at a normal level, ensuring a continuous current of fresh cold water through the generator, and effectually checking any undue rise of temperature.

Above the water-level in the generator—between it and the upper extremity of the carbide-hopper, and in communication with the pipe which conveys the acetylene from the generator to the purifiers—is placed a tube I, furnished with a globe and curved tube, forming a water-valve; so that, in the event of the pressure of the gas in the generator becoming excessive (owing to the action of the water vapour on the carbide in the hopper, or to any unforeseen circumstance), the water is forced into the globe, and the gas is free to pass into the tube communicating with the purifiers. Upon the pressure in the generator again becoming normal, the water in the globe returns to its position in the curved tube, and effectually bars the escape of the gas by this channel.

The acetylene on leaving the generator passes in rotation through the purifiers, preferably four in number and alike in construction. In the first purifier vat B, the trays are charged with sawdust, cocoa-nut fibre, asbestos fibre, slag wool, or similar material, impregnated with dilute sulphuric acid, whereby any ammonia present in the gas is absorbed. Upon the trays of B^1, thick layers of finely-divided oxide of iron are placed, whereby sulphuretted hydrogen is absorbed. The trays in B^2 are charged with thick layers of finely-crushed sulphate of copper and moist sawdust, whereby any phosphuretted hydrogen present is removed. The gas now passes into a fourth purifier B^3, the inlet-orifice of which is fitted with a wire-netting dome. This purifier is simply filled with calcium carbide; whereby as the acetylene passes through this material, any water or watery vapour present becomes absorbed.

Indicating, Recording, and Regulating the Percentage Volume of a Particular Kind of Gas in a Gaseous Mixture.—Arndt, M., of Aachen, Germany. No. 27,757; Dec. 5, 1896.

This apparatus has for its object to automatically indicate and record the percentage volume of a particular gas in a gaseous mixture—such as furnace gases—by conducting them through absorbing apparatus, the working of which (as also that of the recording apparatus) is controlled in such a manner that the gas-vessel is first charged with the gaseous mixture and then shut off; the separation of the gas the quantity of which it is desired to ascertain, being accomplished by a chemical absorbing medium. After the completion of the absorption, the attenuation of the gaseous mixture corresponding to the percentage volume of the separated gas is indicated and recorded by an electric current distributing mechanism, which is actuated so that the current, upon alterations taking place in the percentage volume of the particular gas, correspondingly influences further working parts; and finally the inlet and outlet apertures of the gas vessel are again opened for the purpose of recharging it with fresh gaseous mixture, and repeating the operations.

Prepayment Gas-Meters.—Webber, W., of New York. No. 28,725; Dec. 15, 1896.

This is an "improvement" on the apparatus described in patents No. 19,049 of 1895 and No. 8234 of 1896.

The patentee proposes to provide for opening a valve, arranged in the inlet-pipe supplying gas to the meter, by the power of the purchaser's hand on the insertion of a coin into the apparatus; the valve being closed through the action of the meter mechanism when the quantity of gas corresponding to the coins inserted has passed through the meter. To effect this, he provides a rack in connection with the valve to be opened, which is operated only when a coin has been inserted. In connection with the rack is an escapement device, operated, through the medium of a toothed wheel, by a flag arm or other suitable reciprocating or rotating part of the meter mechanism, so as to control the return of the rack to its normal position, and thereby close the valve.

The arrangement is not described apart from a series of illustrations—14 sheets (46 figures) in all—which it is impossible to reproduce, accompanied as they are by 6 pages of description. There are no less than 27 claims for the invention.

Coin-Freed Prepayment Meters.—Tourtel, J., and the Tourtel Gas and General Engineering Company, Limited, of Aldersgate Street, E.C. No. 28,960; Dec. 17, 1896.

This invention more particularly relates to apparatus in which the coin-operating mechanism consists of a coin-pocket or holder mounted upon a lever arm, or its equivalent, which is always capable of being rotated by the operator, and of a notched disc into the recess of which a coin engages when placed in the coin-pocket—thus causing both the coin-pocket and the notched disc to be locked and rotated together, and actuate a measuring-out screw or equivalent device until a limiting stop is reached at which the coin becomes liberated.

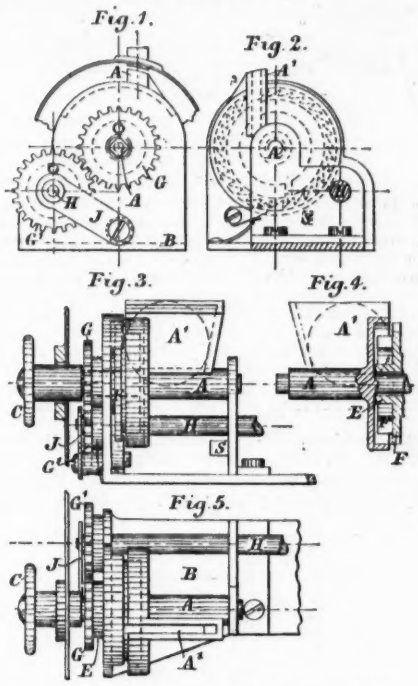


Fig. 1 is an end elevation; fig. 2, a back elevation; fig. 3, a side elevation; fig. 4, a part section; and fig. 5, a plan of one form of meter.

A is an operating spindle, bearing a coin-pocket A^1, supported by a disc and flange. The spindle passes through brackets of a frame B, and has secured to its outer end a handle C, which acts in a boss of the meter-case. Between the handle and the coin-pocket, a sleeve E is loosely mounted upon the spindle A, and bears a disc F, the periphery of which is provided with ratchet-teeth engaging with a pawl fixed on one of the brackets of the frame B. The face of the disc is provided with a cylindrical flange, in which two slots are cut, diametrically opposite each other. G is a wheel secured by a pin to the sleeve E, and retained in position by the handle C. A measuring-out spindle H passes through the brackets of the frame B, and is provided at its outer end with a flange or collar, having a pin, by means of which a wheel G^1 gearing with the wheel G, is secured to the spindle H. A strap or spring J bears against the end of the spindle H, and thus retains the wheel G^1 on the spindle.

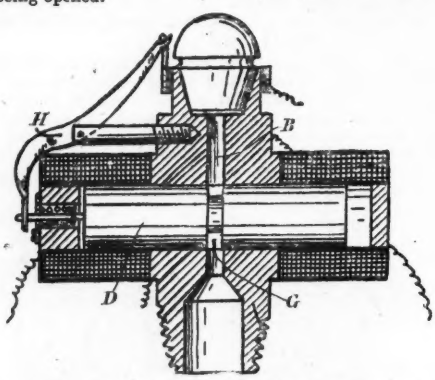
The coin-pocket can always be rotated through a half revolution without affecting the rest of the mechanism; but should a coin be previously inserted in the pocket, it will project into one of the slots of the disc F, and thus lock together the disc and the coin-pocket. Upon turning the handle C, the coin-pocket and disc will therefore be together rotated until a fixed stop S is reached, when the coin will be free to drop into a receptacle below. The disc F is secured in its position, and prevented from a contrary rotation, by means of the spring pawl. The coin-pocket being disengaged from the disc may be returned to its original position, and another coin may now be inserted; but this coin will engage with the

slot of the disc F which is now uppermost, and upon turning the handle the operation already described will be repeated. The motion of the disc F is transmitted through the wheels G G^1 to the measuring-out spindle H, which may be provided with screw gear to be set back by such motion and set forward by the meter-index.

In order to vary the quantity of gas supplied, it is only necessary to change the gearing wheels G G^1, and to substitute for them other wheels having a different proportion of teeth. This is very simply and rapidly effected, without disturbing the rest of the mechanism.

Electrically Operated Gas-Burners.—Petterson, C., of Enköping, Sweden. No. 2039; Jan. 26, 1897.

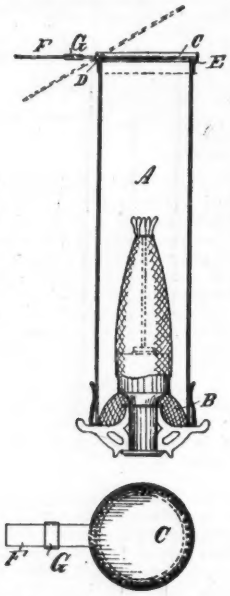
This invention consists in employing a valve, in the shape of a slide, which moves tightly in a transverse opening in the body of the burner, and is provided with an opening through or around itself. The slide-valve is made either partly or entirely of magnetizable material; and each end is surrounded by a solenoid, through which electric currents are sent in opening and closing the burner. The opening through or around the valve is placed so that it is opposite the opening in the burner, when the valve has been pulled over to its extreme limit by sending an electric current through only one of the solenoids, so that the gas will freely flow to the burner proper. When an electric current is sent through the other solenoid only, the valve will be pulled over to its other extreme limit, whereby the opening in the valve will no longer provide communication for the gas, but will entirely close the burner. The lighting of the gas is accomplished by the valve acting on some lever mechanism, so as to open an electric circuit, and cause a spark to ignite the gas while the valve is being opened.



As shown in the engraving, the ends of the piston D move in solenoids, the outer ends of which are closed so as to limit the movement of the piston-valve. An opening G is provided in the piston-valve in such a place that, when the piston-valve is drawn over to one of its extreme positions by an electric current in the corresponding solenoid, the opening will communicate with the gas supply-pipe. When current is sent through the other solenoid, the piston will be moved over to its other extreme position; and the groove will move out of communication with the opening B, so that the gas is shut off from the burner by the piston-valve. When the piston-valve is drawn over so as to admit the gas, it may actuate a lever H, the upper end of which is adapted to open an electric circuit, and cause a spark to ignite the gas; but when the burner is closed, a spring pulls back the lower end so as to close the circuit again.

Protecting Incandescent Gas Mantles.—Mahnke, G., and Kraft, C., of Cologne. No. 24,602; Oct. 23, 1897.

This invention relates to an automatically closing chimney-cover characterized by a metal plate-top mount or ring, to be put on the chimney,



with a hinged cover or lid shutting down on it, and which is balanced so that the ascending current set up by the heat of the flame will raise it, while on the extinction of the flame it will reclose automatically.

The glass chimney A is closed below by a sieve B, and above by an automatically closing cover C, to prevent the intrusion of insects, dust, and the like. The cover turns in a hinge D; and it projects beyond the pivoting point or hinge D, in the form of an extension F. To it a piece of metal plate (bent so as to form a kind of clip) is attached, so that it can be made to slide to and fro, in order to balance the weight of the cover so far as to leave a very slight surplus weight, which will tend to keep the cover on its seat E; while as soon as the gas is lighted, the cover will be raised and brought into the position shown by dotted lines. The surface on which the cover bears when closed is surmounted by a projecting rim on the top ring E.

APPLICATIONS FOR LETTERS PATENT.

30,560.—Eldridge, J., "Anti-vibratory supports for incandescent gas-burners or clusters of gas-burners and gas supplies thereto." Dec. 28.

30,568.—Walker, J. H., "Furnaces or fire-grates for gas-producers." Dec. 28.

30,585.—M'Conechy, J., "Production and storage of acetylene gas." Dec. 28.

30,592.—Lanchester, F. W., "Gas-engine starting gear." Dec. 28.

30,602.—Ritchie, J., "Acetylene gas lamp." Dec. 28.

30,605.—Wynn, J., "Automatic control of the gas supply in gas-cooking stoves." Dec. 28.

30,607.—Wynn, J., "Automatic regulation of the supply of gas to gas-stoves." Dec. 28.

30,633-4.—Robb, J. S, and Smith, W. M., "Acetylene gas generator and lamp." Dec. 28.

30,635.—Ireland, W., "Acetylene gas generators." Dec. 28.

30,637.—Mücke, J. & J., "Acetylene gas generators." Dec. 28.

30,652.—Laudauer, R., "Self-acting gas lighting and extinguishing devices." Dec. 28.

30,673.—Chambers, A. M., and Worrall, J. H., "Coke-ovens." Dec. 28.

30,689.—Lee, G. W., Elliott, F., and Tatham, G, "Manufacture of inflammable gas, and composition to be used therein." Dec. 28.

30,690.—Legge, J. St. C., and Cooper, A. S., "Generator for acetylene gas." Dec. 28.

30,696.—Söhns, W., "Acetylene gas lamps." Dec. 28.

30,721.—Noad, J. H., and Hutchins, F., "Mantle and fringes for incandescent lighting." Dec. 29.

30,792.—O'Brien, J. F., "Mechanism for turning off the supply of gas or other illuminant at any predetermined time." Dec. 30.

30,796.—Dellagana, W. A., and Hand, W. H., "Gas and similar burners." Dec. 30.

30,814.—Jones, W. J. H., "Gas and oil motors." Dec. 30.

30,831.—Moeller, J., "Bunsen gas-burners." A communication from O. Kern. Dec. 30.

30,833.—Yvonneau, C. E., "Treatment of calcium carburet." Dec. 30.

30,886.—Gunning, J., "Apparatus for extinguishing light after a predetermined time." Dec. 31.

30,905.—Kirkpatrick, H. T. E., "Supply cocks for water-meters." Dec. 31.

30,906.—Borchardt, H., "Automatic lighting device for gas-burners." Dec. 31.

Matlock Water-Works Purchase Question.—The Directors of the Matlock Water-Works Company have definitely agreed to sell their undertaking to the District Council for the sum of £18,550. The Council are promoting a Bill in Parliament to carry out additional works at a further cost of £20,000.

A Big Bill for the Caerphilly District Council.—The ambitious scheme upon which the Caerphilly District Council entered last year for securing the gas and water supplies in their district has culminated in a surprise for the members in the shape of a heavy bill of costs. The Council, it may be remembered, applied to Parliament for the necessary powers; but their Bill fell through. Last Tuesday, the Clerk presented the several accounts for payment; the total being £3643 16s. 5d. The members were so shocked that they decided to consider the demands at the next meeting. It is expected that the ratepayers will hold "indignation meetings" in connection with the matter; but, beyond giving the councillors a warming up, little good will ensue. The accounts will have to be paid.

Extension of the Hydraulic Stoking Plant at Beckton.—A large installation of the Arrol-Foulis stoking machinery has been employed by the Gaslight and Coke Company, at their Beckton station, since 1894; and it is satisfactory to learn that the Directors have decided to entrust Sir W. Arrol and Co. with an order for similar plant for the new retort-house at that station. The additional installation will comprise four hydraulic charging and four hydraulic drawing machines, fitted with all the improvements that have been recently adopted by the makers. The charging machines are supplied with coal from two hoppers, each having a capacity of 20 tons, placed over the retort benches; and four elevators are employed for feeding these larger hoppers with coal. The plant also includes four coal-breakers and engines and the necessary hydraulic pumps and other fittings.

Fatality at the Beckton Chemical Works.—A labourer named Weller, employed at the Beckton Chemical Works, met his death early last week through a singular accident, while engaged at his duties. He was, with another workman, named Porter, making cyanide of potassium, which is done by putting potash and sodium into a crucible. After it is heated, it is beaten up with a bar. The crucibles are 11 inches wide and about 4 feet deep. Just after Weller had swept into the crucible the stuff which had come off the bar, his companion heard him scream, and, on turning round, saw him drawing his leg out of the crucible, into which he had evidently stepped. He was taken in an insensible condition to the Seamen's Hospital, where he died from the effects of burns and the absorption of potassium into the system. At the inquest it was stated that it would be impracticable to have a rail round the crucible. The Coroner said it was very singular that the deceased should have got his foot into a pot with so small an aperture; and the Jury, in finding a verdict of "Accidental death," said they thought the pots were not properly protected.

LEGAL INTELLIGENCE.

HIGH WYCOMBE PETTY SESSIONS.

Thursday, Jan. 6.

(*Before Mr.* E. J. PAYNE, *Recorder, and Mr.* H. S. WHEELER.)

Conservators of the Thames v. The High Wycombe Corporation and the Gas Company—Prosecution for the Pollution of a Stream.

To-day two summonses taken out by the Conservators of the Thames against the Corporation of High Wycombe and the High Wycombe Gas Company for the pollution of a stream were heard. The charge against the Corporation was that they, on Dec. 7, 1897, "did unlawfully and wilfully suffer a large quantity of washing or other substance produced in the making or supplying of gas to flow or pass into the Wycombe Stream, a tributary of the Thames, in the borough of High Wycombe, contrary to the provisions of sec. 92 of the Thames Conservancy Act, 1894 (57 & 58 Vict., cap. 187)." The summons against the Company was drawn up in similar terms, with the exception that the words "wilfully cause" were substituted for "wilfully suffer."

Mr. W. S. BUNTING appeared for the Conservators; and Mr. A. J. DAVID represented the defendants.

The Gas Company's case was taken first.

Mr. DAVID said their Worships would learn that there was a complaint here with regard to the very serious result which had arisen from an act that was quite unintentional on the part of the person who committed it. The Gas Company had had the matter under their consideration, and resolved, without reference either to technicalities or the circumstances that had arisen with regard to this, to come and say they exceedingly regretted that any act that had enabled a person in their employ to produce the mischief that had arisen should have been caused by them. The circumstances were that, in the course of the manufacture of gas there was produced a very considerable amount of ammoniacal liquor; and the Company's Manager seemed to have had a very unusual quantity upon his hands. Not having a great call for it, he seemed to have given an order for it to be turned into the drains. Thence it got into the general sewerage system of the Corporation; from there it had found its way into the tanks, and from them to the sewage farm. It appeared to have percolated through the ground, and eventually got either into the Thames or into one of its tributaries; and a large quantity of fish had been destroyed. The act was done without reference to the Directors, who would have prevented it. But without troubling the Bench with evidence, the Company had come there to say they would at once confess that they were liable to some penalty for the negligent act of their servant. He thought it right, on behalf of the Company, to say they cheerfully acknowledged at once that compensation would have to be made by them to other persons to whom injury had been done; and they could do no more than make such reparation as was in their power when an indiscreet act had been committed. He merely called their Worships' attention to the facts to ask them to impose only such a fine as they thought consistent with their duty, seeing that the act complained of was not intentional on the part of any official, and not committed by the negligence of a responsible person, but was one purely of indiscretion.

Mr. BUNTING said he did not wish to unduly enlarge upon the case, but it was right that the Bench should be informed of the exact circumstances. The offence occurred on the 7th of December. It appeared, from the admission of Mr. Thurlow, the Manager of the Company, to the Conservancy Inspector, that on that morning he found the well and pipes full of ammoniacal liquor; that some apparatus ordered had not been delivered; and that he was in the position of having either to discontinue the manufacture of gas or else get rid of the liquor. He (Mr. Bunting) ventured to suggest that Mr. Thurlow gave instructions for the liquor to be pumped into the sewers; and this was done to the extent of from 1200 to 1500 gallons. It began passing on to the sewage farm at High Wycombe at ten o'clock, and continued at full flow until midday. It was extremely offensive. As a matter of fact, Mr. Thurlow very frankly had a sample drawn from the well on the following Friday, in order that the Conservancy Inspector might have it analyzed; and it was found to contain more than 31,000 parts per million of ammonia. The Bench would be able to appreciate the nature of this sample of gas liquor when he told them that 2·5 parts per million of albuminoid ammonia would constitute an ordinarily bad sewage sample. The foreman at the sewage farm said the stench was very bad indeed; and, according to other evidence, it was equally so down the stream to a very considerable distance. Without doubt in the particular stream into which it immediately flowed there was not a single fish left alive. The stream had been well stocked; and though with the Conservancy this occurrence was an important matter, it was not the most important. They were bound to recognize the great damage that had been done. Trout of 4 lbs. or 5 lbs. in weight were killed right and left—in fact, down some four or five miles there was not a fish left alive in the stream. The penalty was only £20; but the Company would not have got rid of their liability when they had satisfied the Conservancy. The Corporation would probably have something to say to them under the Public Health Act, under which the penalty would be £200. He ventured to think, in view of the very serious nature of the pollution, the Bench should impose the maximum penalty.

The BENCH desired to hear evidence before giving a decision.

Mr. *J. Bonnett*, a District Conservancy Inspector, said that he went to the premises of the Company, saw Mr. Thurlow, the Manager, and suggested to him that a quantity of gas liquor had been passed from the works into the public sewers on the 7th of December. Mr. Thurlow frankly admitted that this was the case, and told witness that it was in consequence of the breakdown of the purifying plant and the non-delivery of other. He also said that from 1200 to 1500 gallons of liquor had been pumped into the sewers.

Cross-examined by Mr. DAVID: Mr. Thurlow had no hesitation in telling him everything about it. He (witness) did not see any broken machinery. Mr. Thurlow explained to him that it was by inadvertence that the act was done, and expressed his extreme regret.

The RECORDER said the Bench were quite agreed as to the decision they ought to give in this case. It was an indiscreet act, and it was a somewhat serious breach of the law. It had been suggested that there was a breakdown in the machinery; but they could not take this into consideration. The statute was clear—that if such an act was committed without lawful excuse, the Bench were bound to inflict some penalty. There was no suggestion that there was any lawful excuse, and no reason why this liquor should not have been disposed of in some other and proper way. It was said that the supply of gas would have been stopped. That would have been the better evil than sending this stuff into the sewers, and through them into the Thames. Under the circumstances, they had no alternative but to consider the charge proved, and impose a penalty. They did not think it was a case for the extreme penalty, in view of the general circumstances; and they therefore imposed a fine of £5 and costs.

Mr. BUNTING applied for the prosecution's expenses.

The BENCH allowed a guinea; the Court costs being 12s. 6d.

The case against the Corporation was then taken. This occupied the Court longer, as a question was raised as to liability. In the result, the Bench imposed a fine of 40s., and £1 19s. 6d. costs. The Recorder explained that he did not say the officials of the Corporation or the Corporation themselves had failed in their duty; but, from some cause or another, this offensive matter had been passed through the sewage farm. The Bench had no alternative but to impose a penalty. He thought probably the officials might have done more than they did. They did not seem to have done anything; and it was more or less on this ground that they based their decision. There was no intention on their part to poison the River Thames; but through not making any change in their ordinary course of treating the sewage, which they might have done, the stuff percolated through the ground, and got into a tributary of the river. Mr. David asked for a case, and it was granted.

Breach of Duty at the Falmouth Gas-Works.

At Falmouth, yesterday week, Charles Wasley, a gas stoker, was charged with breach of contract by Mr. J. W. Buckley, the Manager of the Gas Company. It was stated that Wasley was employed as a gas stoker from Dec. 7; and on Christmas Day he was supposed to work from 6 p.m. to 6 a.m., but left at 11.30 p.m. without the slightest notice. His wages were 23s. a week. Wasley, in defence, said the foreman did not tell him he must not leave. His wife asked him not to work on Sundays, as she had been seriously ill. This being the first case of the kind that had ever been tried at the Court, and as the Company had asked the Bench to deal lightly with defendant, he was only fined 15s. and 13s. costs, or seven days' imprisonment.

Thefts from Prepayment Meters.

Two youths, named William Strong and Richard Hargreaves, were charged before the Manchester City Justices last Wednesday with having stolen 4s. 4d. from a prepayment gas-meter, in an unoccupied house in St. Clement's Place, Longsight. On Dec. 30 the lads were seen to enter the house; and a constable afterwards found that the money had been abstracted from the drawer of a penny-in-the-slot meter. Mr. Cheetham, who appeared to prosecute on behalf of the Corporation, stated that, within a radius of a hundred yards of the house in St. Clement's Place, no fewer than fifteen similar robberies had taken place. The offence was admitted; and the Magistrates (remarking that they were compelled to make an example of the prisoners) sent them to prison for a month. On the same day, a young lad named Thomas Langham, was charged with a similar offence; the sum stolen being 1s. 6d. In this case the prisoner and another boy broke off the lock, abstracted the money, and spent it in visits to the baths and in the purchase of cakes. The prisoner was remanded, in order that steps might be taken to send him to a reformatory.

At the Lambeth Police Court, last Saturday, Joseph Heyburn, 18, described as a kitchen porter, was charged on remand (see *ante*, p. 31) with stealing 8*d.* in bronze, the moneys of the South Metropolitan Gas Company, from an automatic gas-meter at 161, Neate Street, Camberwell. When taken into custody, the accused admitted having committed the robbery, but pleaded in extenuation that he was out of work at the time, and had no money. It was now stated that the Company did not wish to press the charge, in view of the prisoner's previous good character. Mr. Hopkins told him he ought to be grateful to them, and ordered him to be discharged.

The Quality of the Water Supply at Goole and a Consumer's Water-Rate.

Much interest was displayed last Wednesday week in a decision at the Goole Police Court, when a Mr. Cawthorn was summoned by the District Council for refusing to pay his water-rate. His defence was that the quality of the water was bad and the supply intermittent. After devoting much attention to the case, the Bench decided that, as it stood, they must order the payment of the amount claimed. In announcing this decision, the Chairman (Dr. Blair) added that there seemed to be an important point behind the case—whether a District Council supplying water not up to a proper standard were entitled to claim full payment of the rate. They had had no evidence on the point, and had not sufficient information to enable them to decide this matter; but Mr. Cawthorn had pressed for a decision. On these grounds, they would direct the case to be re-tried, and argued before them. Mr. Cawthorn said, unless the ratepayers helped him, he was not prepared to fight their battle farther. He thought, however, that what had passed would strengthen the hands of the Council when they applied for money to rectify the mistake they had made. The Chairman said the Water-Works Clauses Act made it compulsory upon the Local Authority to provide a pure and wholesome supply. Mr. England, for the Council, remarked that he did not dispute their obligation. Mr. Taylor (a Magistrate) said the Council must take some steps to remedy the supply. The water for the last two years had not been pure and the supply continuous. Mr. Cawthorn decided to accept judgment for the amount claimed from him with costs, and not carry the case farther at his own expense.

THE ROPE-GUIDED GASHOLDER AT MIDDLESBROUGH.

CONSTRUCTED BY MESSRS. ASHMORE, BENSON, PEASE, & CO., LIMITED, STOCKTON-ON-TEES.

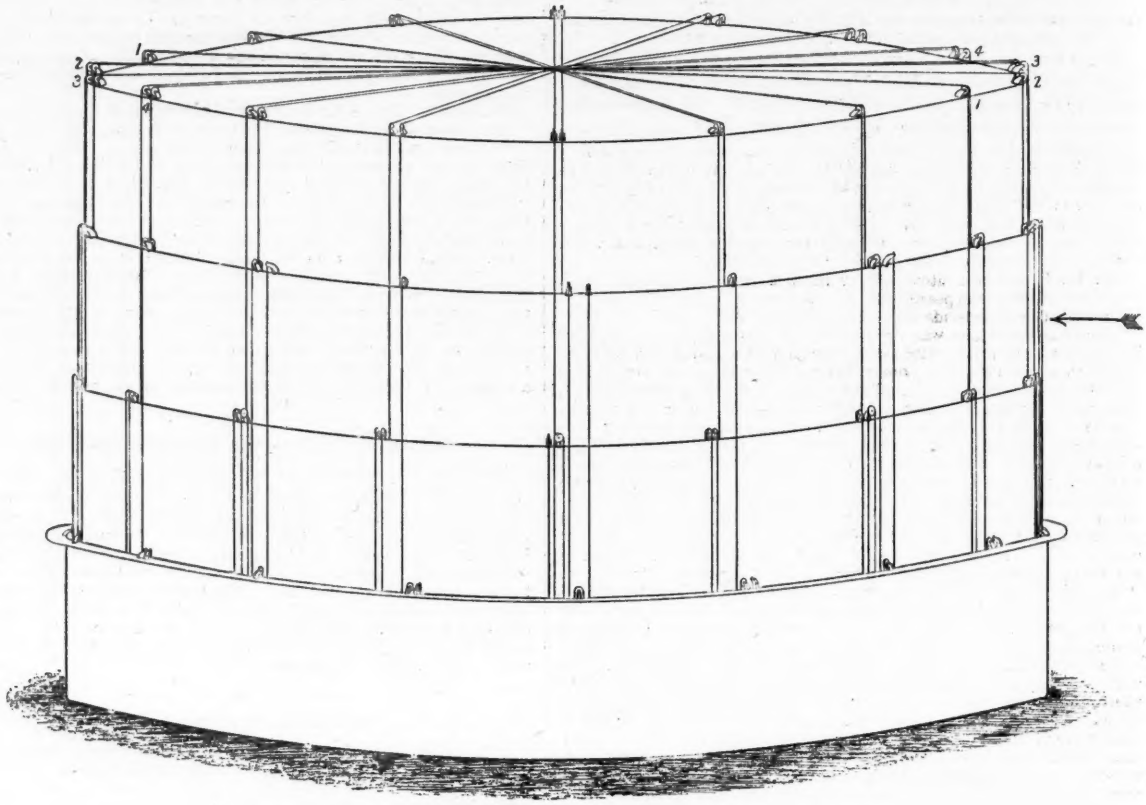


DIAGRAM SHOWING ARRANGEMENT OF STEEL CABLES ON THE HOLDER.

The holder is 184 feet in diameter and 30 feet deep. The number of cables employed is 18, each having a breaking strain of 18 tons. The power of control of the cables is increased by being arranged in double and triple purchase on the outer lift. With a 30-lb. gale (total pressure 105 tons), the four cables 1, 2, 3, 4, would be strained to 2½ tons each. Every cable crossing the crown is capable of acting at both ends with a total control either four or six times greater than its breaking strain.

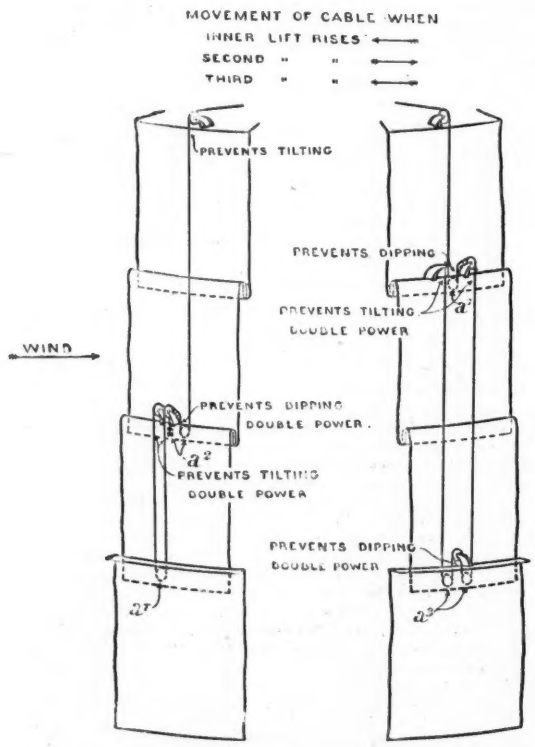


DIAGRAM OF ARRANGEMENT OF A CABLE IN DOUBLE PURCHASE ON TWO OUTER LIFTS AND SINGLE PURCHASE ON THE INNER LIFT.

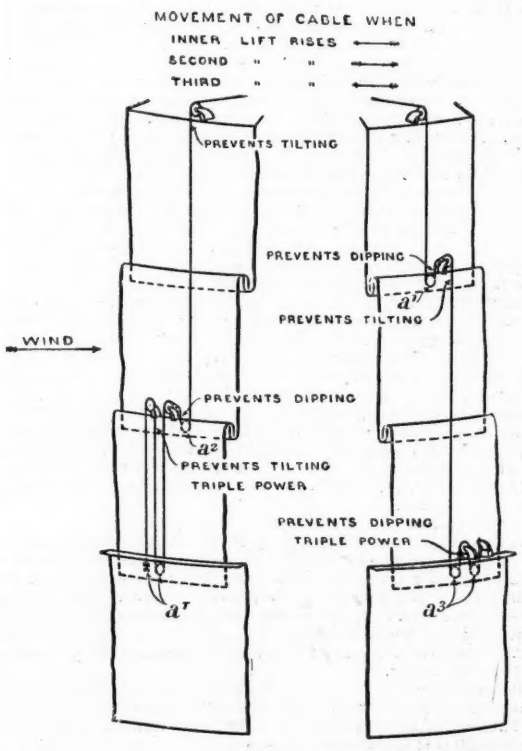


DIAGRAM OF ARRANGEMENT OF A CABLE IN TREBLE PURCHASE ON OUTER LIFT AND SINGLE PURCHASE ON THE TWO INNER LIFTS.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The Rope-Guided Holder at Middlesbrough.

SIR,—Now that the large holder at Middlesbrough has been thoroughly overhauled and has been fully inflated, it is possible that some of your readers may be interested in the fact, seeing the extent to which this holder figured a few months ago. Unfortunately, the weather has proved unsuitable for securing a good photograph, but the enclosed diagrams may possibly be of interest to those who prefer details.

The tank has not been altered as regards foundations, and varies in level at different points of the circumference—the extreme variation being something more than 7 inches. The tank guides, including additional channel guides, were all made vertical; many requiring packings of 4 inches or more. The rest-stones also received attention; but with these exceptions the tank remains as it was. The outer lift of the holder, which was the portion that sustained the most damage, has been thoroughly repaired.

The diagrams on the opposite page show that all cables now pass over the crown, and also that a certain number are arranged so as to give a power of three at each end. This is the first occasion on which a greater than double power has been used. It will be observed also that the added control is secured simply by the end attachment of the cables being on the tank instead of the holder. Since the holder was first erected, experience has shown that there is nothing to be apprehended by the use of long cables; and it is now further shown that the use of the triple power adds nothing to the pressure required in working a holder. How far the arrangement of multiple powers may ultimately be taken, cannot now be stated; but it is clear that the possibility of multiplying the strength of one rope many times without introducing practical difficulties is a very important factor in gasholder construction.

Stockton-on-Tees, Jan. 7, 1898. E. LLOYD PEASE.

Public Lighting by Oil and the Charge for Gas to Private Consumers.

SIR,—A Gas Company in which I am interested are in the following position: The district is wide; it embraces several local authorities, all of whom, till a few years ago, contracted with the Company for the supply of gas to the street-lamps. One of these authorities some ten years ago ceased to do this, and uses some oil, by which the Company lost between £700 and £800 rental.

The Company have been desirous of reducing the price of gas to the private consumers in all the districts; but loss of rental has prevented them doing so while guarding the interests of their shareholders. They also feel that it is unjust to those districts which have continued the use of gas in the street-lamps to be charged a higher price to private consumers than they would be if all districts had acted as they have done.

It has been mooted that the price of gas to private consumers in districts where gas is used in the streets should be reduced 3d. per 1000 cubic feet; leaving the price as it now stands in the district where they have shut off the gas. Shareholders who propose this argue that the pipes have been laid for the purpose of street lighting as well as for private lighting, and at the cost of the Gas Company; and if the inhabitants of a district diminish their use of gas, they should not expect to receive it at so cheap a rate as if they extended it.

A highly respected consumer in what I will call the "dark" district objects that his district should not have the 3d. reduction also—that it is punishing his district. It is replied: "Just so; that is what is intended. But come into line with the other districts, and then your punishment will cease; you will have the 3d. reduction." But he says: "Up till now we cannot; there are so many Socialists on the Local Board, who are not of the class that pay much rates, and if you do not lower the price in our district at the same time as the others, you will anger us who are gas consumers." To which it is replied: "We would be sorry to incur your anger, but as you say you would like gas in the street-lamps instead of oil, would not the fact that you would be charged 3d. per 1000 cubic feet more with oil than those in the next parish, waken you up to get better men on your Council who would vote for gas." To which he replies: "Ah—hem—yes; but I think the reduction should be made all round."

Possibly some of the readers of the "JOURNAL" have been placed in a similar position, and would not object to giving their views on the matter, or saying what they think would be equitable in the circumstances.

35A, *Great George Street, Westminster, Jan.* 7, 1898. GEORGE ANDERSON.

Gaseous Firing.—Referring to "A Country Gas Manager's" letter under this heading in the last issue of the "JOURNAL," Mr. Percy H. Fletcher, of Evesham, will be glad if the writer will kindly state what size and length his retorts are, what quantity of coal is carbonized per charge, the duration of the charge, and what seal he has in the hydraulic main.

The Morley Corporation and the Local Gas-Works.—The Morley Town Council on Monday last week resolved to proceed with the promotion of the Bill of which they have given notice for the purchase of the undertakings of the Morley and Churwell Gaslight Companies; and they have also decided to oppose the Bill of the former Company, and the Provisional Order of the latter.

The Proposed Vienna Gas Loan.—The Vienna Municipality do not seem to be very successful in raising the money for carrying out their gas undertaking. Negotiations were in progress for several weeks with the Deutsche Bank, but without result—except, perhaps, the production of a little ill-feeling between the parties. It is reported that the Crédit Lyonnais is not indisposed to treat with the Municipality, provided they will consent to the issue of the loan in gold. This proviso, it appears, it will be impossible for the Council to comply with, owing to the fact that a new Bill empowering them to do this would have to be laid before the Legislature.

MISCELLANEOUS NEWS.

INTERFERENCE WITH GAS-PIPES FOR LAYING ELECTRIC LIGHTING CULVERTS.

The Award in the Northampton Case.

In the "JOURNAL" for Sept. 14 last (p. 601), reference was made to a dispute which had arisen between the Northampton Electric Light and Power Company and the Gas Company in regard to the laying of electric lighting culverts in the town. The former Company had served two notices upon the Gas Company of their intention to lower every gas service-pipe in certain places specified within a depth of 1 ft. 10 in. below the surface of the pavement to a lower depth. The Gas Company objected to this; and as the parties to the dispute were unable to come to an amicable arrangement, the matter was referred to the Board of Trade, who appointed Major-General A. de Courcy Scott, R.E., to conduct an arbitration thereon. This took place in the Town Hall, Northampton, on Sept. 7, 1897, when the Gas Company were represented by Dr. Faulkner (Messrs. Dennis and Faulkner), and the Electric Light Company by Mr. E. Montague Browne. The latter said it was desired that all the gas service-pipes should be uniformly depressed; and the witnesses called in support of his Company's case expressed their opinion that it was desirable, for many reasons, that the electric lighting culverts should be shallow; that it was not unreasonable to ask power to depress the gas service-pipes; and that permission to do this was generally readily conceded by gas companies. The Engineer to the Company (Mr. W. E. Heenan) later on said it was only proposed to alter the positions of those pipes that could be moved without detriment to the Gas Company. For the latter, Dr. Faulkner contended that the proposals of the Electric Light Company, as contained in their notices, were absolutely impracticable without lowering the gas-mains; and the Company did not seek to do this—in fact, he did not suppose they would ask for the power, because it would involve such an immense expenditure on their part that they would prefer to lower their culverts. Mr. J. Eunson, the Engineer to the Gas Company, supported Dr. Faulkner's statement. He said that, speaking generally, it would be impracticable to comply with the desires of the Electric Light Company, except by lowering the whole of the gas-mains. George Hull, one of the Company's outdoor foremen, corroborated Mr. Eunson's evidence. With regard to the second notice received by the Gas Company, it was arranged, at a meeting of the parties held on Nov. 17 last, that the evidence then adduced should be taken in conjunction with that given on the former occasion.

At the close of our previous notice of this matter, we remarked that the award of the Arbitrator would be awaited with interest; the point raised in the case being a new one. It has now been made. Major-General Scott sanctions the alterations specified in the two notices, subject to the following modifications:—

(*a*) If the level of the centre of the gas-main at or opposite the point of connection of any gas service-pipe with such main is 2 feet or more below the level of the surface of the pavement of the footway at the point vertically above the point where the longitudinal axis of such pipe crosses the longitudinal axis of the culvert laid down or proposed to be laid down by the Electric Company, then the Electric Company may lower such pipe.

(*b*) If the level of the centre of the gas main at or opposite the point of connection of any gas service-pipe with such main is less than 2 feet below the level of the surface of the pavement of the footway vertically above the point of crossing above mentioned, then the Electric Company may raise such pipe.

(*c*) The inclination or fall of every gas service-pipe which shall be lowered or raised shall be in the same direction as before the same shall be lowered or raised.

(*d*) The rate of inclination or fall of every gas service-pipe which shall be lowered or raised shall not, after the same shall be lowered or raised, be at any part less than 1 inch vertical in a horizontal distance of 8 feet.

(*e*) No gas service-pipe shall be lowered so that the highest point of the pipe at the point of crossing above mentioned shall be more than 1 ft. 10 in. below the surface of the pavement of the footway vertically above such point.

(*f*) No gas service-pipe shall be raised so that its longitudinal axis at the point of crossing above mentioned shall be less than 11 inches below the surface of the pavement of the footway vertically above such point.

(*g*) In order to conform to the foregoing modifications or conditions, any gas service-pipe may be disconnected from the gas-main to which such pipe may be at the time connected, but, if disconnected, shall be re-connected with such main; and in making such re-connection no hole shall be made in such main in such a position that the centre of such hole shall be below any point midway between the highest and lowest part of such main.

(*h*) The culvert proposed to be laid down by the Electric Company shall not be placed over any gas service-pipe unless and until such pipe is protected so as not to come into contact with, or be injured by, the base of such culvert; and in every case in which a gas service-pipe is lowered, a free passage shall be provided for such pipe beneath such culvert so that it can be withdrawn from under such culvert without difficulty.

If, in order to comply with the foregoing conditions, it is necessary to make in any gas-main a new hole or new holes, the centre of which shall be below the highest point of the surface of the main at the junction with the service-pipe, the Electric Light Company are to pay the Gas Company, within one month from the making of the hole, the sum of 4s. 6d. as compensation, in addition to all the expenses properly incurred by the latter Company in complying with any notification of the former under the 17th section of their Order of 1890. The two Companies are to bear their own expenses in connection with the arbitrations, and pay one-half the costs of the award. It will thus be seen that the Gas Company have obtained most important restrictions upon the exercise by the Electric Company of their powers, and that the generality of the notice given by the latter has been considerably modified in favour of the Gas Company.

GAS WORKERS' WAGES AND HOLIDAYS AT STOCKPORT.

The application made to the Gas Committee of the Stockport Corporation by the employees at the gas-works, for certain alterations and amendments in regard to their wages and conditions of work, were considered at a special meeting of the Committee last Thursday. The men asked, first, that each stoker should carbonize 3 ton 5 cwt. of coal at the rate of 5s. 6d. per shift, instead of 5s. as at present. The Committee decided not to make any alteration in this respect. Secondly, the men asked that the firemen should each attend to eight small fires, or five regenerators, and do their own firing, at the rate of 5s. 6d. per shift of eight hours; but the Committee maintained that the firemen must each attend to eight small fires and eight regenerators at the rate of 5s. per shift of eight hours. The men next asked that all carbonizers working nine months should be allowed one week's holiday with pay; those working six months, four days' holiday with pay; and those working four months, two days' holiday with pay. The rule up to last Thursday was that all carbonizers regularly employed in the retort-house should be annually allowed one week's holiday with 25s. pay for stokers and firemen, and 20s. for charge wheelers. The Committee resolved on the following holiday scale: Men working twelve months, one week; those working nine months, four days; those working four months, two days—in all cases with pay—providing the man applying for the holiday has done his duty to the satisfaction of the Engineer (Mr. S. Meunier). The labourers requested payment of not less than 5½d. and not more than 6d. per hour, as against 4½d. and 5½d. as at present. The new arrangement is that the minimum shall be 5d. and the maximum 5½d.; but this will mean that the men must be competent hands. A new clause was inserted by the men, but refused by the Committee, to the effect that 6d. an hour should be paid to labourers employed in repairing, cleaning retorts, cutting out fire-holes, hydraulic mains, &c. The Committee consented to a new rule that all labourers, after working six months, should be entitled to any holidays with half pay, occurring during their term of employment. It was also agreed that the gas-makers and wheelers in the water-gas department should be paid exactly in the same way as stokers and wheelers in the retort-house, and that they should have the same holidays with pay in accordance with the length of time they have been employed in the department. The men held a meeting at the Millgate works after the decision of the Committee had been made known to them; and it is not expected that any trouble will arise.

DARLINGTON MEDICAL PRACTITIONERS AND WATER GAS.

At last Thursday's meeting of the Darlington Town Council, the Mayor (Mr. Widdowfield) stated that he had received an important communication from the leading medical men of the town in regard to carburetted water gas. He suggested that the letter should not be discussed on that occasion; but should be referred to the Gas Committee. This course was adopted. The letter was as follows:—

It having been brought to the knowledge of the undersigned medical practitioners and the public of Darlington generally that it is the intention of the Gas Committee of the Darlington Corporation to lay down plant for the manufacture of carburetted water gas to increase the illuminating power of the coal gas by adding or mixing it with the coal gas, and as such addition or enrichment adds immensely to the risk to life and health, we desire to point out some of the dangers that will arise from such a course.

It is well known that coal gas if inhaled for a length of time, even if freely mixed with air, will destroy life. This result is largely due to the presence in it of carbon monoxide. This dangerous compound is contained in ordinary coal gas as supplied by gas companies in the proportion of 4 to 8 per cent. From this it will be seen that coal gas is not a constant composition, but varies at different times and in different towns in the amount of this deadly compound it contains. At present in this country, there is no legislation which binds a gas company to supply illuminating gas of a stipulated standard of purity. Consequently there is nothing to prevent any gas manufacturing company from adding carbon monoxide *ad libitum*.

Carburetted water gas contains 30 per cent. of carbon monoxide; so that if 25 per cent. of carburetted water gas be added to our present coal gas supply, it will considerably increase its lethal power. It must be clearly borne in mind that carbon monoxide is the most dangerous gas poison there is; and the attempts made by some supporters of carburetted water gas to gloss over this fact, are as mistaken as they are mischievous.

The following are some of the dangers we would point out are incurred in supplying illuminating gas highly charged with carbon monoxide:

Firstly, carbon monoxide is of light specific gravity (·9687), and hence easily diffused, being lighter than the atmosphere.

Secondly, having no odour of its own, the smell of a mixture containing it does not so readily attract attention as that of pure coal gas. A person may be in an atmosphere dangerously charged with this gas without being sufficiently warned of its dangers.

Thirdly, the strong affinity that the hæmoglobin of the blood (whose function is the carrying of oxygen to all the tissues of the body) has for carbon monoxide. So great is this affinity that the hæmoglobin will take up the carbon monoxide in preference to oxygen; and thus its value as an oxygen carrier becomes deteriorated, and in severe cases finally destroyed. This diminution in the supply of oxygen to the tissues may and frequently has caused death. But even short of such a fatal consequence, it is well known that if an atmosphere only slightly charged with this gas be inhaled in our living rooms, bedrooms, offices, and on the streets as we pursue our daily avocations, the general health of each individual so situated will be deteriorated, and his resisting power to disease of any kind diminished. There will, we feel sure, be many cases of persons complaining of ill-defined maladies, headache, giddiness, lassitude, as well as neurotic anæmic conditions—in fact, chronic poisoning of a more or less serious character.

Being fully aware of the dangerous nature of the proposal now adopted by the Council, we feel bound, in the interests of the public, firmly, but respectfully, to sound an alarm before it is too late. Feeling strongly on this subject as we do, we are distinctly of opinion that we should be wanting in our duty to the public if we did not make known the truth as we believe it, clearly and unmistakably, on this very important question.

[Here was appended the names of sixteen medical gentlemen]

ELECTRIC LIGHTING NOTES.

The Corporation of West Bromwich and the Oldbury District Council have decided to oppose the application of the Midland Electric Corporation for Power Distribution; both Local Authorities having themselves applied for Electric Lighting Orders.

Last Tuesday, Colonel C. H. Luard, R.E., held an inquiry, on behalf of the Local Government Board, at the Municipal Buildings, West Hartlepool, with respect to the application by the Corporation to borrow £30,000 for the purpose of lighting the town by electricity.

The Torquay electric lighting works are approaching completion. According to a report presented to the Town Council last Tuesday, the cost will be £22,189, while the sum authorized to be borrowed is £22,300. The Town Clerk added the information that a further expenditure of £800 would be necessary for making consumers' connections. Mr. Bunting said the Committee spent all their money before they had laid all the mains; while Mr. Pike added that they had laid only three out of the four miles of mains for which they had borrowed money. The Town Clerk said the Corporation could, if necessary, apply for more money for further extensions.

According to the list of tenders which has just been published, the original estimate of the cost of the Plymouth Corporation electric lighting station was much too low. In his report on the probable cost of the undertaking, the Engineer put it at £7500; but the lowest estimate received for the building as designed was £14,951, while to complete it in nine months, which the Committee propose in the hope of having the plant ready for next winter, the lowest tender was £15,844. In their report, which was laid before the Town Council yesterday, the Committee state that they have devised measures whereby the cost of the building can be reduced by from £2500 to £3000 without interfering in any way with the stability of the structure. They recommend that the tender of £15,844 for the execution of the work in nine months be accepted, subject to it being revised in accordance with a bill of additions and deductions, with the object of reducing the cost of the works. The contractors have assented to the terms.

Some of the members of the Peterborough City Council are up in arms against the Local Government Board for having refused their consent to the borrowing of £15,000 for the purpose of electric lighting in the borough, on the ground that the borrowing powers of the Corporation would not admit of the sum being raised. A special meeting of the latter was held last Wednesday to consider the matter, when some of the members were in favour of ignoring the Local Government Board altogether, by installing the electric light, and obtaining a mortgage of £15,000 on the security of the sewage farm. Five members supported this defiant proposition; but milder counsels eventually prevailed. The Town Clerk pointed out that the balance of borrowing power was £30,601; and Mr. Beeby thereupon moved that the attention of the Local Government Board should be called to the mistake in their figures. This was carried; and a further resolution inviting the Board to send down an Inspector to inquire into the matter was next adopted.

The Salford Town Council last Wednesday had a long discussion on a motion by Mr. Haworth, Chairman of the Electricity Committee, to the effect that application be made to the Local Government Board for authority to borrow £50,000, for the extension of the electric light undertaking. Last year the loss on the works was £3975; but this year it is hoped to reduce it by at least £1000. During the nine months that have elapsed since the management of the works was transferred from the Gas Committee to the Electricity Committee, the undertaking has made remarkable progress—the number of 8-candle power lamps in use having increased from 11,400 to 22,000; and in a few weeks it is expected to be further increased by several thousands. Extension of the works is now urgently required. At present the high-pressure alternating system is in use, and has proved unsatisfactory; and it is now intended to erect a new station on land in another part of the borough, and to change to the low-tension system. This, however, is subject to the opinion of the Electrical Engineer and of the experts who are to be called in. The proposed application was agreed to.

At a meeting of the Nottingham City Council in Committee on Monday last week, the Town Clerk (Sir S. G. Johnson) laid before the members the Bill, already referred to in the "JOURNAL," which is being promoted by Sir T. Thompson, Bart., and Messrs. W. A. M'Arthur, E. A. Lazarus, and A. R. Monks, for the purpose of supplying electricity within a radius of 26 miles of Warsop Church, including the city of Nottingham. The Company will have a capital of £1,000,000 divided into £750,000, in £1 shares, and £250,000 which the Company may borrow. The Company cannot start until £125,000 has been paid, or a sum equal to £2 per share. With this money it is proposed to purchase land at Sookholme, near Warsop, and there to build and construct works for generating electricity for distribution throughout the district defined. The Bill asks for power to break up all roads and streets, and to disturb existing pipes, wires, and works under streets, in order that the Company may lay their mains and pipes for the distribution of electricity. The Company may also, according to the Bill, go beyond the prescribed area, with the consent of the local authority; but within it they can exercise their powers without such consent, subject, however, to this provision—that before commencing any works in any street they must give notice to the local authority of what they intend to do. The latter may object; and then the whole matter would be referred to the Board of Trade, who would to this extent, therefore, be substituted for the City Council as far as Nottingham is concerned. The policy of this measure, it was explained, is contrary to the practice of Parliament with regard to Nottingham for the last quarter of a century. During this time the inhabitants have made many sacrifices in order to retain the control of the streets, and have the custody of those elements of municipal government which are necessary for the welfare of the inhabitants and the business requirements of the city. In the Bill under consideration there are a set of clauses enabling the Company to supply electric power in bulk;

but there are no provisions enabling a local authority to compel the Company so to supply them. It was pointed out that the object of the Company is to set on foot an imitation of the American system, as at Niagara, of generating electricity at the centre of one of the great coal-fields, and distributing it throughout a given area. The Council unanimously resolved that the Bill must be opposed in the interests of the city; and a strong Committee were appointed to deal with the matter—the Town Clerk also being instructed to draw up a petition against the Bill, and take all necessary steps in conducting the opposition in Parliament.

Our readers may remember that in September last the Leeds City Council requested the Parliamentary Committee to inquire into the expediency of giving notice to the Yorkshire House-to-House Electricity Company, Limited, who now supply the city with electric light, requiring them to sell their undertaking to the Corporation. The Committee were assisted in their labours by the City Accountant (Mr. Derry), who furnished them with calculations and suggestions. The Committee's report, in which they recommended the purchase, was submitted by the Chairman of the Committee (Mr. Wilson) at the meeting of the Council last Wednesday. He said they were of opinion that if the undertaking was to be purchased at all, it should be bought quickly. The longer the matter was delayed, the more the Corporation would have to pay. The report showed that the capital value of the undertaking on Dec. 31, 1896, was £101,077; and in the opinion of Mr. Derry it was desirable, if the Corporation should determine to purchase, to issue a 5 per cent. irredeemable stock for the purpose. In deciding to buy, the Council would be able to remedy the mistakes committed when the governing majority were in doubt as to the utility of electricity. He proposed the adoption of the report. Alderman Lupton feared that the Council were about to take upon themselves responsibilities from which only officials would reap benefit. The Act prevented them from making any profit above the 5 per cent. In a few years the machinery would be rendered obsolete by changes in electrical science. Alderman Baker contended that the Company would be able to do the work much better than the Corporation. Mr. Leuty said that now electric lighting had become a commercial success, it was clearly the duty of the Council to purchase. The result of waiting longer would be that they would have to pay twice as much. Mr. Ford thought the main reason why they should purchase was that the undertaking had proved a commercial success. The revenue of the Company had increased from £3771 in 1893 to £14,728 in 1896, and was said to have further materially advanced during 1897. The dividend had gone up from 4 to probably more than 6 per cent.; and the price to the consumer had been reduced. Alderman Gordon, alluding to the fact that a Company had been allowed to introduce and develop the electric light, said the Corporation were purchasing quite soon enough. It was well to let an industrial undertaking be proved to be a success before the Corporation took it over. A loss might result from the transaction to the Corporation. At any rate, the acquisition would be no great haul for the consumers. One very definite advantage would be that the Corporation would resume the control of the streets, while at the same time they would be in possession of an undertaking that would pay its way in a year or two. The report was adopted. Mr. Wilson then moved that application should be made to the Local Government Board for a Provisional Order authorizing the Corporation to issue irredeemable and redeemable stock for the purpose of the purchase; and the motion was carried. It was next resolved that the Council, without prejudice to their parliamentary powers, should open negotiations with the Company for the acquisition of the undertaking.

MID-SUSSEX WATER-WORKS ARBITRATION.

Westminster Palace Hotel—Tuesday, Dec. 21, 1897.

(*Before Sir* GEORGE B. BRUCE, *Umpire.*)

The proceedings in this arbitration case (see *ante*, p. 36) were resumed to-day.

Mr. R. E. MIDDLETON, M.Inst.C.E., was Arbitrator for the Company; Mr. JAMES MANSERGH, M.Inst.C.E., for the District Council. Mr. CRIPPS, Q.C., M.P., and Mr. SCOTT FOX appeared for the Company; Mr. BALFOUR BROWNE, Q.C., and Mr. BOXALL represented the Council.

Mr. CRIPPS said that Mr. Hill and Mr. Hawksley had drawn up their original valuation on a misunderstanding in reference to the baths and water-closets. The result was that the figures relating to the new supplies, instead of being based upon £2·15 per supply, ought to be based upon £1·64. This would reduce the present value of the new supplies to houses on the line of the existing main from £21,933 to £16,730; and it would also reduce the present value of new supplies to houses along the lines of the proposed mains from £8233 to £6967. The total of the valuation made by Mr. Hill and Mr. Hawksley would thus be reduced from £92,432 to £85,316.

Mr. *William Whitaker*, F.R.S., in reply to Mr. CRIPPS, said that the wells and headings were in beds which were members of the Hastings series of the Wealden beds. In order to increase the supply, he should be inclined to deepen the well and extend the galleries, and probably deepen them too. For present purposes, there was an ample water supply—in fact, they did not pump persistently. He thought that rather more than 230,000 gallons per day could be obtained fairly easily from the present well.

Cross-examined by Mr. BALFOUR BROWNE: He did not call to mind any case of works in the Hastings sand where, though water might be secured at one time, it disappeared at another; but he knew that it was not a geological formation from which they could get enormous supplies readily, unless they had large works. They might get half as much again water from the present well fairly easily.

By Mr. CRIPPS: I think I am going within the bounds of safety in saying that. I could not say how much more; but it might be a good deal. I do not see that the works I suggest would be very costly, for the result to be secured. It is a matter of driving, say, 100 feet of gallery, which cannot cost anything very enormous.

Mr. *R. H. Harland*, a public analyst, in reply to Mr. SCOTT FOX, said that on Nov. 18 last, he took two samples of the Company's water after filtration. Speaking generally, he found it was very free from organic pollution, and fairly soft. It was in his opinion a very excellent public supply. It was quite as good as one or two of the public supplies to London—the New River, for instance, or even the chalk wells of the Kent Company.

Cross-examined by Mr. BALFOUR BROWNE: He had also analyzed the water before filtration. The difference between the two filtered waters and the unfiltered water, was mainly in respect of the small quantity of iron contained in the water as pumped from the well. He had made nothing but a chemical analysis. The water, as he took it, was perfectly bright and clear; and there was not much solid matter in it.

Mr. MANSERGH: This water distinctly requires filtration?

Witness: Yes; it is absolutely necessary to filter it, so as to remove the iron.

Mr. CRIPPS: You say filtration is necessary; but that is being done?

Witness: It is being done.

Mr. *Scott Pitcher*, an auctioneer and estate agent at Hayward's Heath, said that the rateable value there had been increasing recently at the rate of about £1000 a year. There was no doubt the fact of there being a water supply had had something to do with the additional extension. With everybody who came to him for houses, the first question almost that they asked was: "Is water laid on?"

Mr. *R. A. Cripps*, examined by Mr. SCOTT FOX, said that he was a consulting chemist, and that his laboratory was at Hayward's Heath. He had frequently analyzed the Company's water, with the result that he had found it to be remarkably free from all organic impurities, and to be moderately soft. He had also analyzed samples of water from private wells in the Hayward's Heath district; and out of 33 samples, he had had to condemn 23. In the Cuckfield Rural District, he had analyzed 25 samples from private wells, and had condemned 9 utterly, and 6 with certain provisoes. In June of this year, he had written to the Clerk of the Hayward's Heath Urban District Council to the following effect: "I have again to urge the importance of adopting mains to prevent the so frequent delivery of water containing large quantities of iron-rust in suspension, which has been a marked feature of the supply during the end of May and the beginning of June." He was referring there to the Company's water.

By Mr. CRIPPS: The Mid-Sussex Water Company's supply I have examined twice, and sometimes more frequently, per quarter during the past four years or so; and on every occasion I have had to report that the water is, in a special sense, of good quality. But there is from time to time iron-rust, sometimes in considerable quantity, which comes out with the water. This naturally makes it unsightly, and causes people to be more or less upset in their minds; and they often come and ask me about it.

Mr. CRIPPS: But you see no objection at all from a sanitary point of view?

Witness: Certainly not. Of course, people would not drink the water full of rust.

This concluded the case for the Company.

Mr. BALFOUR BROWNE, in opening on behalf of the Council, said that he was not questioning the quality of the water. After filtration, it was fairly good. The most difficult question for them to decide was how they were to value the undertaking. He had never before seen such a valuation as that which was put in by Mr. Hill. There was, in fact, no valuation in it from beginning to end, except on the first page, and that was fallacious. The rest was a work of the purest imagination. He agreed with his learned friend that capital expenditure had absolutely nothing whatever to do with it; but, on the other hand, the valuation of what was there, what the Council were to get—that was, structural valuation—had got something to do with it. In this particular case, there was no goodwill value at all; and it was not really in any true sense of the word a going concern. It had a revenue, he admitted; and if they chose to go upon that revenue, properly treated—not as they had put it down—then it would bring out a less sum than would be found by going upon a structural valuation. The opening page of their valuation, which gave the first head of their claim—namely, £36,700 upon their present water-rental—was entirely wrong, because £6600 would have to be deducted for additional works; the existing works not being in a condition to maintain the revenue. This would reduce the figure to £30,000, even assuming that the calculations upon which it was based were correct. How on earth the Company ever came to accept an Act of Parliament with section 91 in, he for the life of him could not conceive. They had been spending their money with a sword hanging over their head; it was the most drastic clause that he had ever seen in a Water-Works Act. The Company had now lost a large number of their rights, through the proviso that if they did not make adequate provision in any parish for the supply of water within the limits of the Act within five years of the date of the passing of the Act, the restriction on the construction of water-works by a local authority should not apply to, or be binding on, the local authority. Under section 91, the Company were protected only until the completion of the works, The day after they were finished, the Local Authority might give them notice that they required them, and the Company would have to part with them.

The UMPIRE: What do you call completion?

Mr. BALFOUR BROWNE replied that completion meant when they began to supply. Continuing, he said Mr. Hawksley had told them that, if they got a case where there was no prospective value and no revenue to multiply, that was one for structural valuation. Here they had a revenue, and they could multiply it if they liked; but, in the end, it would turn out to be less than the structural valuation. And there was no prospective value in this at all, because they had taken it on a three months' notice. What goodwill would there be in any undertaking in the world, if the owner could be turned out in three months. An ordinary water company had perpetuity—subject, of course, to the power of Parliament to step in with a new Act, and take it away. That was why there was a multiplier for absolute permanence. The 33½ years' purchase meant that these people could go on supplying water for all time—subject to the paramount power of Parliament to take it away. But this Company could not do that. This was the Company's own Act, which they went to Parliament with in the first instance, and made the offer. They said: "We are willing to supply upon these terms," which means that there is no prospective value. And why? They were buying out some old Company; they were threatened with opposition by the Local Authority; and they could not have got the Act of Parliament at all if the Local Authority had opposed. In order to take the wind out of the

sails of the Local Authority, they put this clause in the Bill and said: "We will turn out as soon as anybody gives us the notice of three months." Mr. Hill brought out the gross annual receipts at £1835; but the actual amount, as shown by Mr. Lass's table, was £1528. They might imagine that the difference between £1500 and £1800, at a 33⅓ multiplier, was enormous. The working expenses in 1894, 1895, and 1896 were 100 per cent., 74 per cent., and 57 per cent. respectively; and in the first half of 1897, they were 44 per cent. But the Company took 40 per cent. as the "normal" amount, which was entirely erroneous. It was quite clear that the working expenses had been scamped in these years. Why, for instance, the repairs and maintenance of works and mains had been reduced from £118 in the first of these years to £17 in the last was not explained; and no Engineer had been brought before the Umpire to tell him. He (the learned Counsel) suggested that it was in order to bring down the working expenses, so as to increase the net result. He thought Parliament meant that the Company should have the full price of their undertaking; and he could show that the figures in the accounts, which looked like £53,000 odd being expended, were absolutely fallacious.

Major *Lister*, Chairman of the Cuckfield Rural District Council, said that there had been complaints about the water, and about the charges made by the Company. There had been a complete failure in the water supply. Shortly after the Council had given notice that they would not buy, there was considerable indignation in the district; and pressure was put upon the Board to take the water supply in their own hands. In consequence of that, about July 7 last the Council gave notice to purchase under section 91.

Mr. *Thomas Fenwick*, M.Inst.C.E., in reply to Mr. Balfour Browne, said that he had never heard of any other water-works scheme with a similar clause to section 91. He had inspected the pumping-station and works of the Company, and considered that there was an estimated population in the whole area of about 14,000. About a third of the population might be taken as being supplied at present by the Company; and when they had reached their maximum, if they were not disturbed at all, and if there was not the power to purchase under section 91, they might calculate on supplying in addition to the third about 1500 people more. He had valued the works both structurally and by revenue. The structural value was a valuation of everything that was to be found upon the works to-day.

Mr. Cripps: Of course, you will naturally hear anything Mr. Fenwick has to say. I do not put it in the way of a threat, as my learned friend suggested, but merely to reserve our rights. We consider that evidence of structural value is not relevant, and that is not what you have got to consider.

The Umpire: I do not think I can decline to hear it.

Witness (continuing) said the structural valuation, with the additions which he thought ought to be put to the actual value of the property, would come to practically the same as the valuation by revenue. His valuation of the engine and boiler house, coal-store, filter-bed, brick-tank, manager's house, service reservoir, well, and pumping-engines, mains and pipes, and land came to a gross total of £21,875. The works could be reproduced on the land for this money; but, of course, they would have to pay the Engineers, and so on. A commission of 10 per cent. might be added for this. Then he thought the Company ought to be allowed a certain sum for parliamentary and preliminary expenses; and £3000 would be a fair sum to allow for all this. This would bring his structural valuation up to £29,250. In order to check his valuation, he had valued the Company's income. He had assumed that by next year there would be a net annual revenue of £1100, subject to debenture interest. Considering the fact of the three months under which the Company were liable, he thought it was not a concern which ought to be valued in the ordinary way of a perfect water-works; and then there were some defects which had been given in evidence as to the incomplete condition of the pumping-engines. There was also the fact that before the concern could be considered perfect, there ought to be a duplication of the engines and pumps, even to secure this revenue in the year 1898-9. Taking all these things into consideration, the proper number of years' purchase for the concern, on the estimate he had given, was 28½, on the 3½ per cent. table. But he discounted this for twelve months, to give the present value, as they were bound to take into consideration the fact of the Company being under three months' notice. This calculation came out to £31,350, which, discounted at 3½ per cent. for a year, brought it to the present value of £30,440. Then there was a profit on fittings for the next five years, amounting to £430, which made the total gross valuation on income £30,870.

Mr. Cripps, in cross-examination: Taking your view of section 91, what is the new principle that you apply here for your valuation purposes, which you say you have never met with before?

Witness: It is that a company have undertaken to construct these works, and get what revenue might be obtained from them for a very limited period.

Would you have altered your valuation if the notice had been a twelve months' one?—I do not think I should.

Should you have altered it, if the notice had been a week?—No. It does not depend upon the length of notice, but merely upon a notice which certainly does place the undertaking in a different position altogether from the ordinary. Witness added that he had been engaged in a great many cases; and he should say that the rule was to value by income. His structural valuation, of course, included the necessary sum for contractors' profits.

Suppose you had a concern which, instead of giving £1100 a year in perpetuity, was going to be £1100 for a few years, then mount up to £1500, and then to £2000 a year in perpetuity after a time, you would have to allow for these increments?—If the revenue is to rise as you suggest in twenty years, then, of course, due consideration must be given to that. But this is a case in which I have considered the possibility or otherwise of the revenue rising in such an increased ratio as has been suggested by the valuations; and I do not think it is possible. In the first place there is no certainty that the water is there. Witness remarked that he did not think they could reckon as a certainty upon the capacity of the well being more than 120,000 gallons a day.

Re-examined by Mr. Balfour Browne: If this was an absolute holding in perpetuity, would you ever think of giving more than 33⅓ years' purchase.

Witness: No; and if it were a fifty years' lease, we should probably have given 25 years' purchase.

Wednesday, Dec. 22.

Mr. *Samuel Wood*, of Messrs. Lass, Wood, and Co., proved the figures relating to the accounts of the Company, as taken out by his firm. These figures, of course, pledged him to nothing; they were only a representation of what the books showed. The liabilities of the Company up to June 30, 1897, amounted to £67,102; the actual amount expended on works and mains being £48,692, and the preliminary and parliamentary expenses amounting to £5171. In the year 1895-96, there was a profit of nearly £2 for each new customer. In the following year, the profit on each new customer averaged nearly £4. The working expenses in the last year he had taken were the lowest by 12 per cent. of the last four years. In the figure he had given as representing the total liabilities of the Company, the shares were taken as worth their nominal value.

Mr. *Corbet Woodall*, M.Inst.C.E., examined by Mr. Balfour Browne, said he had visited the works, and was generally acquainted with the district. He had never heard of another company being under such a clause as clause 91. Although in the preliminary Local Government Board inquiry it was stated that the money was already in hand, the Company appeared to have been in monetary difficulties from the first, judging from the reports of the Directors. Money being difficult to get, necessarily made the works costly; there being nothing so cheap as doing it in sovereigns. As the Contractor had to receive a considerable amount in scrip, he would naturally get a larger nominal payment; and therefore the heavy expenditure which was charged to capital account did not, to his mind, represent the actual value of the works. He valued the works at £28,900. He allowed £469 for land, fencing, and surface works; £3700 for well, bore-hole, and pumping during construction; £1852 for engine and boiler house, including boiler-setting and chimney; £2200 for pumping-plant, boilers, engine, pumps, and gearing; £700 for cottage; £860 for the filter; £1800 for the reservoir; £10,490 for mains and services; and £4200 for engineering, surveying, clerk of the works, and parliamentary and other preliminary expenses. These figures brought out the structural value at £26,273, to which he had added 10 per cent. (£2627) for contingencies, making a total of £28,900. Then he felt it would be unfair to value the undertaking after five or six years of work at merely the cost of the buildings and plant. The Company had undertaken a considerable amount of risk. They had invested their money for a term of years with comparatively no return; and he thought that equitably they should have a consideration for it. Under the Act the matter was referred to arbitration; and it would be for the present tribunal to say what this consideration should be. He had therefore added to the end of his valuation, the words: "Allow premium," in order to introduce that element into it.

Cross-examined by Mr. Cripps: His view of section 91 was that they were to sweep the future out of sight.

Mr. Cripps: Gentlemen like yourself on the one side, and Mr. Hill and Mr. Hawksley on the other, do not really differ—you have been advised to put different constructions on section 91, and you have acted on advice?

Witness: That is so.

That is the real difference between you?—Yes.

Mr. Balfour Browne: On principle; not upon figures?

Witness: Quite so.

Mr. *E. K. Burstal*, M.Inst.C.E., in reply to Mr. Boxall, said that he had acquainted himself with the history of the Company; and their powers under the Act of 1890 had lapsed in certain districts. The works consisted of a well 264 feet in depth, with engines and pumps for lifting the water; and a brick-built open receiving-tank, partly used as a filter, and fenced, whence the water went into the service reservoir, and then into the mains. The total length of the mains was just under 20 miles. The contract price for the works was £30,279. In regard to the extras, he thought they were excessive. For instance, there was a charge of £2450 for a larger engine. The increase in the size of the engine was only from a 15 to 20 horse power, which involved a small increase in the diameter of the shaft, and a slightly heavier fly-wheel. Taking the list price of the firm who made the engine, the difference amounted to not £120 all told. He would have liked to have done the additional works at the high prices charged, if he had been paid in cash. He looked upon the undertaking as one which was always liable to be transferred at three months' notice; and the Company's Act was the only one he had been able to find with such a clause in it as clause 91. Generally speaking, when water-works were transferred they were in a prosperous condition; but in this case the undertaking was really only commencing. He estimated the structural value of the works at £26,097. If, on the other hand, the undertaking was purchased as a going concern, he estimated that the price should be £24,313, which was a lower figure than the structural valuation.

Cross-examined by Mr. Cripps: He did not, like Mr. Woodall, add to his structural valuation 10 per cent. for contingencies; but at the foot he added 7½ per cent. for engineering and supervision, which was the usual figure. Neither did he invite the Umpire to make any sort of "equitable addition," as Mr. Woodall did, under the words: "Allow premium." His view of section 91 was that the Company were tenants at three months' notice.

Mr. Cripps: In other words, if the Company are only getting £800 a year, including the debenture interest, although next year they might be having £3000, they must be bought out on the £800, and not given any consideration for the £3000 they might be getting in another year?

Witness: That is the view I take—that you have practically no future here on which you can calculate prospective profits. I have never seen a clause like this in any Act of Parliament before.

You have got in the accounts a larger engine £2450, a figure which, of course, you criticize?—Yes, because Mr. Hill told us that the whole of the machinery could be duplicated for £1500.

I suppose you are not aware that the provision of the engine, and so on, was carried out under a sub-contract?—No. But I know that a smaller engine had not been delivered when the larger one was ordered; and I have allowed over the list price a sum which was given, and 20 per cent. for any intermediary employed—if bought from a dealer, and not a maker.

You are not aware that Mr. Robus, the Contractor, somewhat took your view, and unsuccessfully went to law with the sub-contractor, because he thought he had charged him too much?—I was not aware of Mr. Robus's affairs.

Mr. BALFOUR BROWNE, in re-examination: You know nothing, of course, of what Mr. Robus may have done as to the sub-contract, or as to the actions at law; but do you say, that £2450 is an excessive sum for the addition that was made?

Witness: The value of the addition that was made, I undertake to say was not £250.

Mr. *Strachan*, in reply to Mr. BALFOUR BROWNE, said that he had inspected the works on three occasions; and he found that they were not in a satisfactory condition. He had advised the Local Authority not to have anything to do with the concern. Soon after this, there was a breakdown; and he was told by the Clerk that the Local Authority were, by public opinion, pressed to take over the works. He then had to consider the question of what should be paid to the owners, seeing that the Local Authority were going to exercise their power under section 91. To his mind, there was no prospective value in this section. He thought the three months' notice absolutely shut them out from that, and also depreciated the present value of the concern. He considered that the capital account of the Company was very much swollen, and was absolutely fallacious as a guide to the true value of the undertaking. He valued the works structurally at £22,775. To this he added £1700 for engineering, and £3000 for the Act of Parliament and the Board of Trade Order; making a total of £27,455. The works could be constructed for this amount, and would give a contractor a substantial profit. Each of the prices he had allowed at the rate for which contractors had successfully done works for his office.

Mr. *William Beach*, Surveyor to the Cuckfield and Hayward's Heath District Councils, said that there had been a great many difficulties with Mr. Robus in getting him to re-instate the roads properly, and about having the hydrants put in. He considered the Company's charges were very high. When the water was laid on to the workhouse, they tried from a hydrant to what height it could be used in case of fire; and they found that they could not get it to the eaves of the roof. There were several cases among the new supplies anticipated by the Company's witnesses, in which he did not think water was likely to be taken.

Major *Maberley* said that he had been put down as one of the owners or occupiers who were likely to take a supply of water from the Company; and that his rateable value was £212. He took the Company's water for fire purposes and for a small cottage; but he would never dream of having it for any other purpose. He had got a very ample supply, which was better than the Company's water; and it cost him nothing but the wear and tear of the machinery and pumping.

Other local witnesses gave evidence as to their private supplies, and the charges made by the Company when their water was taken.

Mr. *C. O. Blaber*, M.Inst.C.E., in reply to Mr. BOXALL, said that he had made an inspection of the works. He considered their structural value, exclusive of the engineer's charges and parliamentary expenses, was £21,688.

Mr. *Jesse Finch*, a builder at Hayward's Heath, said that land in the district had not gone up in value during the lifetime of the Water Company—in fact, it was not worth any more to-day than five years ago.

The proceedings were then adjourned until Jan. 12 (to-morrow), when Counsel will address the Umpire.

THE WATER SUPPLY AT THE RECENT CITY FIRE.

Our readers are aware that an inquiry is in progress into the origin of the serious fire which broke out in Jewin Street, E.C., on the 19th of November, and resulted in so much destruction of property. Shortly after the occurrence, certain newspapers, without any justification, attributed it to an explosion of gas; while others asserted that had there been an adequate supply of water the fire would have been subdued much sooner than it was. Both assertions have been disproved by the evidence given at the investigation. With regard to the supply of water, the Secretary of the New River Company (Mr. J. Searle) promptly set the newspapers right as far as the bulk of water pumped on to the blazing buildings was concerned, for which, he reminded them, no payment is made; and last Friday, the Company's Engineer (Mr. E. Collins, M.Inst.C.E.) gave some additional particulars which are worth reproduction. He said the number of hydrants in the immediate vicinity of the fire was 50, of which 26 were in use during the time the brigade was at work on the 19th of November. All of them could be turned on by firemen, so that there was no need to wait for a turncock. As a matter of fact, however, one of the Company's turncocks arrived on the spot simultaneously with the first steam-engine. The water supply for the district affected by the fire was obtained from the Company's reservoir at Claremont Square, Islington, which, when full, holds 3½ million gallons; and it was connected with their reservoir at Maiden Lane, Highgate, holding 15 million gallons, and with their reservoirs at Crouch Hill, which would hold 12 millions. All these reservoirs were brought into connection during the continuance of the fire; and he estimated that about 5 million gallons of water were used before they received the "stop" call. Of course, large quantities of water were employed for seven or eight days afterwards in order to extinguish the smouldering *débris*. The fire covered four acres, and 5 million gallons would work out so as to give them a depth of 5 feet of water over this area. The outlet-main from the Claremont Square reservoir was 36 inches in diameter, which gradually diminished to 24 inches, 22 inches, and 21 inches; the last named being the size of the main running through Aldersgate Street. In Barbican the main was 12 inches in diameter; and it was connected through Redcross Street to a 19-inch main in Cheapside. All these leading trunk mains were again connected with mains of smaller diameter in various back streets. The hydrants in the City were fixed by the Corporation; but the Company had gone to considerable expense from time to time in increasing the size of the mains as occasion required. Of course, the object of the existing system of hydrants in the City was to enable the Fire Brigade to obtain water at any moment without having to wait for the arrival of a turncock. The hydrants were, in other words, intended to supersede the turncocks, but not the fire-engines. The Company's returns showed that the mains were kept fully charged from the outbreak of the fire until it was extinguished; and he might add that they had been fully charged ever since. On the day of the fire, they had not a single main shut down for repairs in any part of the affected district. The pressure of water on the day of the fire would be equal to an 80-feet head from the pavement level, or about 35 lbs. per square inch. If buildings were burned down, the Company lost the revenue derived from them; and so, to this extent, it was to their interest to do what they could to assist in extinguishing fires. Asked his opinion of underground water-tanks, he said that in many parts of the City they would be impracticable, except at what was a prohibitive cost. Whether or not such tanks would be of service to the brigade, it was for the Authorities to say; and he felt certain that if they wished for them his Directors would do all they could to assist in this respect. The main in Jewin Street was 7 inches in diameter, connected with a 22-inch main at the Aldersgate Street end and a 12-inch main at the Redcross Street end. It would be quite possible to obtain a supply of water from the Thames for fire purposes, if necessary; but this would require the construction of buildings and the laying of fresh mains. He thought the City was very well protected as it was, so far as water was concerned. They could not have anything very much better. Witness had standing instructions to report to his Directors whenever he thought it necessary to increase the size of the mains in any of the streets. In the last ten years they had relaid 100 miles of pipes, increasing the sizes from 3 to 4 inches.

THE EPIDEMIC OF TYPHOID FEVER AT MAIDSTONE.

The Analysts' Reports on the Water Supply.

It may be remembered that shortly after the outbreak of typhoid fever at Maidstone last September, the Medical Officer of Health for the borough (Mr. M. A. Adams) and Dr. Washbourn, of Guy's Hospital, were requested to examine and report upon the water supply from the Farleigh area, which there was reason for suspecting was the cause of the epidemic. Their report has lately been issued. In the course of their introductory remarks, they point out that the earliest samples of water were collected on the 19th of September, and that the incubation period of typhoid fever, though variable, may be taken, on an average, at 14 days. In addition, an allowance must be made for the time occupied in the distribution and consumption of the water. Three weeks or more can therefore be allowed as the period which would elapse between the actual infection of the water with typhoid material and notification. Making these allowances, the condition of the water examined during the height of the epidemic (Sept. 19 to 27) could only account for the cases notified between Oct. 10 and 18—a period when the acme of the epidemic, as shown by the notifications, had passed. The Analysts have good reasons for believing that, had the tests been made between Aug. 28 and Sept. 9, more abundant evidence of pollution would have been forthcoming; and there would have been a greater prospect of discovering the specific micro-organism associated with typhoid fever. They remark that proof of pollution of water may be obtained either from chemical or from bacteriological examination. A chemical examination may give evidence of pollution, though the bacteriological evidence is negative, for the living micro-organisms may have disappeared at a time when the chemical constituents of the polluting material are still present. On the other hand, proof of specific contamination with typhoidal material could only be obtained by bacteriological evidence—by the discovery of the typhoid bacillus in the water. The difficulties of discovering this bacillus in drinking water are, they say, so great, that it is still a debatable question whether they have ever been surmounted. On this account, and for other reasons, their failure to find it in any of the samples examined does not afford any evidence against the view that the disease was conveyed by the water. They go on to say: "The chemical analysis, when viewed in the light of a knowledge of the natural characteristics of the water of the district obtained by 25 years' experience, shows such a departure from the normal as to give most conclusive evidence of pollution. . . . It is easy to find evidence of pollution, in various degrees, of the samples examined. As far as the bacteriological evidence is concerned, the only samples which showed distinct evidence of contamination with animal excreta were those derived from the spring at Tutsham-in-Field. That no bacteriological evidence was forthcoming in the several cases where chemical evidence of pollution was strong, can be accounted for by supposing that at the time of the collection of the samples bacterial life had ceased. Of the different waters, the Ewell springs were undoubtedly the best. The bacteriological examination was always, and the chemical analysis in most cases, satisfactory; but on Sept. 19 even this water exhibited a decided excess of albuminoid ammonia, and 50 per cent. more oxidized nitrogen than a good water should. The worst water was undoubtedly that of the Tutsham-in-Field spring. It gave distinct bacteriological evidence of contamination with animal excreta, and contained a large excess of albuminoid ammonia and an excess of oxidized nitrogen on both occasions on which it was examined. Some of the other springs were nearly as bad chemically."

Mr. Adams makes a separate and detailed report upon the samples of the water from the Farleigh springs analyzed by him. With regard to the spring at Tutsham, he states that, beyond question, the water was "thoroughly bad, bearing evidence of serious pollution by organic matter, only part of which was oxidized; the remainder being in a condition suitable to convey water-borne disease." Dealing with the same spring, Dr. Washbourn says that specimens of the water taken on Sept. 21 and Oct. 19 were examined. The specimen taken on the former date contained 560 bacteria in a cubic centimètre. There were about 60 colonies resembling coli colonies in a cubic centimètre. A number of these were isolated and tested in various ways, and were proved to belong to the coli group; some presenting typical and some atypical characteristics. No typhoid bacilli were found. One specimen, of Oct. 19, contained 776 bacteria per cubic centimètre. There were about 16 colonies resembling the coli colonies in this quantity. Some of these were obtained in pure cultivations, and were proved to belong to the coli group. They were all of an atypical variety. No typhoid bacilli at all were found, though a large number of

colonies were examined. Some of the bacteria isolated bore a close resemblance to the typhoid bacillus in morphology and in the failure to produce gas in gelatine and to clot milk. A further examination showed that these bacilli were not typhoid bacilli, for they either failed to react to the serum test, or produced gas in media containing dextrine, or in some other way differed from the typhoid bacillus. Dr. Washbourn's general conclusion with reference to the spring is as follows: "The Tutsham-in-Field spring was undoubtedly contaminated with animal excreta on both occasions on which it was examined. It contained an excess of bacteria and many coli bacilli."

Dr. Washbourn prefaces his report on the bacteriological examination of the Maidstone water by a few preliminary remarks on the general subject of water pollution. He says that, roughly speaking, a water containing fewer than 100 bacteria per cubic centimetre may be considered to be a good water, providing they are the ordinary water bacteria. An excessive number may be due to contamination with fæcal matter; but there are other causes. The coli groups of bacilli are constantly present in large numbers in the intestinal canals of man and other animals. They are, *par excellence*, the bacteria of alvine excreta, and are found in large numbers in sewage. These bacteria are widely distributed, and may be present in small numbers even in the best of water; but if present in large numbers, they show that the water has been contaminated with animal excreta. It is a debatable question whether it is possible, in the present state of knowledge, to discover the presence of the typhoid bacillus in water contaminated with animal material. Most of the cases in which typhoid bacilli are stated to have been found in drinking water occurred at a time when the tests available for distinguishing the typhoid bacillus from other bacteria were insufficient. The source of contamination of water with typhoid material is probably always the excreta of patients suffering from typhoid fever. Such water would contain large numbers of coli bacilli in addition to much smaller numbers of typhoid bacilli. The difficulty, if not impossibility, of recognizing the typhoid bacillus in these circumstances, is so great that no importance can be attached to the failure of discovering the typhoid bacillus in water suspected of being the cause of an epidemic of typhoid fever. Of much greater importance is evidence of contamination with alvine excreta; and such evidence can be obtained by the presence of large numbers of coli bacilli.

The District Council and the Water Company.

The Water Committee of the Maidstone District Council have been advised by Messrs. Sharpe, Parker, and Co., who have been called in to act for the Corporation in connection with the proposed public inquiry in regard to the typhoid epidemic, that they have no ground of action against the Water Company, inasmuch as they have, as a corporate body, suffered no loss; the Company, moreover, being under a contract to supply the Authority with water for street watering and flushing purposes only. The opinion of the above-named firm is that the case of the private consumer stands on a different footing, and that there is ground for a test action for the recovery of damages against the Company, who are under a legal obligation to supply pure and wholesome water for domestic purposes. The Committee have decided to prepare a case for Counsel's opinion on both points. It is further understood Messrs. Sharpe, Parker, and Co. are convinced that, by taking any part in the proposed public inquiry, the Corporation will incur large expense without obtaining any beneficial result, and that a test case against the Company will serve all purposes. Notwithstanding this, the majority of the Committee, which is composed of the whole Corporation, with the exception of members who are shareholders in the Company, adhere to their view that a public inquiry is both necessary and desirable; but they have decided to ask the Local Government Board to defer it until Dr. Theodore Thomson, who was originally sent down to privately investigate the cause or causes of the epidemic, has presented his report. Dr. Thomson was recalled when a public inquiry was decided upon.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

Sir John Batty Tuke, President of the Royal College of Physicians, Edinburgh, the recipient of a New Year knighthood, writes as follows to the "Scotsman": "I see another danger in connection with the adulteration of the Edinburgh gas supply with a much more poisonous gas than that now in use. In many invalid and semi-invalid rooms—*e.g.*, the rooms of persons suffering from insomnia—it is a common custom to leave a glimmer of gas burning. Some time during every night, the pressure suddenly falls. On the re-establishment of pressure, an escape, of course, takes place, unless the occupant of the room is awake and shuts off the gas. This has happened to myself on several occasions. With a more poisonous gas the danger is evident; and the citizens should be warned against the practice." This last attempt to rouse the public has hung fire. Nobody has taken any notice of it. Meantime, carburetted water gas is supplied in Edinburgh; and the public are unaware of it.

The Dundee Town Council are not yet able to make up their mind as to the extensions which are necessary at the gas-works. The cost seems to be the chief difficulty; and they are casting about for a cheap method of getting the work done. On Tuesday, when the Gas Committee met, the Clerk reported that he had addressed letters to Belfast, Brighton, Liverpool, London, and Edinburgh, on the subject of the comparison of carburetted water gas with coal gas, in the matters of expense, utility, and safety; and that he had received replies from the managers of the gas-works in these places to the effect that carburetted water gas was as safe as coal gas, and could be produced at less cost. These communications were ordered to be printed for circulation among the Councillors. The Manager (Mr. W. M'Crae) submitted a letter which he had received from Mr. Corbet Woodall, strongly recommending the introduction of carburetted water gas. The Council met on Thursday; but this subject was only incidentally before them. Mr. Ballingall moved that they acquire the ground to the east of the gas-works, at a price of £9300. Treasurer Ritchie thought the sum was too large, being equal to 27s. per pole; and he moved that a firm offer of £8300 be made for the land. Mr. Peebles moved that they do not buy the ground. In his opinion, it had not been proved that they needed it. If they adopted carburetted water gas, they would require less ground than they did at present. Mr. Brownlee considered that it would have helped the Council very much to make up their mind if the Committee had proceeded in what he would call a reasonable way. They were face to face with a very extensive undertaking—a large amount of money had to be spent. In short, it meant the reconstruction of their whole works. In such circumstances, they would naturally have expected that the Committee would first of all have had plans prepared and agreed upon, before they recommended the Council to proceed in any way whatever. If the Committee had done this, the Council would have seen whether or not it was necessary to acquire additional ground. His own opinion was that they would need it; but he was quite sure that half of the members had not made up their mind as to whether it was necessary or not. This was a very unfortunate position in which to put the Council. To say that they would have to put down a gasholder somewhere, but they could not say where, was not a proposal to put before a Board of sensible people. There might be a complete plan agreed to by the Gas Committee, submitted to the Council, and adopted by all. Before they committed themselves to such a large undertaking—which would cost about £100,000—they should see from the beginning to the end of it. Mr. Ballingall's motion, that the purchase be made, was carried by a majority. The Council are thus committed to a scheme of extension of some sort. What they are to do with the land, is the next question for them. One of the things they most need is increased gasholder accommodation. Mr. Ballingall moved that they proceed with the erection of a new holder, at a cost of about £30,000; and that Mr. M'Crae be instructed to prepare plans, specifications, and detailed estimates. Mr. Brownlee again submitted the proposal that they should delay coming to a decision until they had before them a plan of what was proposed. To this Mr. Ballingall assented, on condition that Mr. M'Crae should take Mr. Foulis along with him. I think the Council have adopted the sensible course. Having resolved to acquire the ground, it is better that they should see how their Engineer proposes to utilize it before they resolve upon anything. But what can explain or require the following expression, which occurs in the leading columns of a local paper: "The Gas Committee seem to have plenty of expert assistance at command. Let it be the business of the experts to castigate their brains to some purpose"? It is altogether uncalled for. A fear or doubt of your neighbour seems to be a feature of Dundee municipal life, extending even to, or perhaps emanating from, the intellects which dominate the local press. A generous trust and a large-hearted policy, would be more becoming, and probably more profitable.

The Corporation of Falkirk recently reduced the price of gas to the ordinary consumers by 2d. per 1000 cubic feet. There is a large consumption of gas through prepayment meters. These were not included in the reduction; and, to remedy the defect, Bailie Hamilton, the late Convener of the Works Committee, moved that all consumers of gas through these meters should get a proportionate allowance. The charge upon them is at the rate of 4s. 2d. per 1000 cubic feet, and is 7d. above the ordinary figure. The difference is too great, especially when it is considered that the Corporation have at present in hand a surplus of £1400 on their gas account. The motion was opposed; and among the arguments used was the one that in Falkirk they were giving 25 cubic feet of gas for 1d., whereas in a neighbouring town they were charging this sum for 20 cubic feet. The opposition were successful by six votes to five; and so the reduction is not to be made. A meeting of users of prepayment meters has since been held, at which the following resolutions were passed: "(1) That we adopt means to spread the agitation in all the districts where slot meters are in use under the Corporation, so that our just demands may be conceded; (2) that we prepare a petition for the signatures of all who are willing to assist in getting uniformity of prices, and, failing that, that we demand to be supplied with ordinary meters; (3) that a Sub-Committee be appointed to receive communications from other districts for the purpose of arranging a suitable meeting-place for all interested." The Corporation, having appointed a gentleman to report to them upon the quality of the gas, have, I daresay, got more than they bargained for. The gentlemen has written that the results of tests of the gas which he had made could only be regarded as approximate, for the following reasons: "(1) The standard clock goes about two seconds per minute too fast, with the regulator set at the slowest; and the tests were made with a stop watch. (2) The barometer is not accurate; and the result was corrected by a barometer reading taken at the Science School. (3) The candles, in burning, far exceeded the prescribed limit when the door of the testing room was closed. With the door open, except when a reading was being taken, the time of burning was brought nearer to the limit, but was still in excess. This might cause great error." He recommended that the clock and barometer be put right. The candles might not be of good quality; but he was of opinion that the testing-room was very insufficiently ventilated, and that this was causing the candles to burn slowly and irregularly. He had found the readings go up in five minutes from 10 or 11 to 13 or 14 candles, when the door was closed. With the door open, there was a draught, which also caused irregular burning. Without better ventilation, he did not think it would be possible to get very trustworthy readings. There was a meter and apparatus for determining the sulphur and ammonia in the gas; but it was not connected up, and there was no place where it could be set up in the testing-room. There were no means, either, for doing the necessary weighings and measurings for these determinations. This is a long indictment. The work of testing must now, however, go on; and all the Commissioners could do was to remit the subject to the Works and Lighting Committees, jointly, to report upon.

The Stirling Police Commissioners have resolved to oppose the Gas Company's Bill before Parliament, in order to get terms; one of these being the payment of way-leave for the Company's mains.

At a meeting of the Sub-Committee on Finance of the Glasgow Gas Trust, held on the 29th ult., the Treasurer (Mr. J. Fleming) reported the collection of gas-rents at that date as follows: From June 1, and for the financial year 1897-8, the receipts amounted to £132,476, while in the corresponding portion of 1896-7 the amount received was £126,462; showing an increase over about seven months of £6014. This is certainly a large advance, especially in view of the fact that the demand for electric light is also on the increase.

The Directors of the Kilmalcolm Gas Company were not idle during

the past year. They thoroughly renovated their works, extended the mains, and introduced new appliances for the more economical production of gas. The work was carried through by Mr. J. Brodie, who was appointed Manager early in the year, in succession to Mr. J. Currie, now of the Vale of Leven Gas-Works.

The first town I have heard of in Scotland to adopt the supplying of hot water from gas lamps, according to the system of the Pluto Hot Water Syndicate, is the Corporation of Dumfries. At a meeting on Thursday, they agreed to give the Company permission to fit up two lamps in the burgh with their apparatus; the hot water to be supplied at the rate of ½d. per gallon—the Company to pay for half of the gas consumed during the night, and for all burnt during the day. It has been pointed out that it would be advisable for a notice to be put up intimating that it was hot water which was supplied, otherwise people might get their mouths scalded if they applied them, as is sometime done by workpeople when taking a drink at a public well. Probably the delivery-pipe will be placed so that one could not get his mouth to it. But there is another risk which I am afraid will limit the adoption of these appliances, which is that children may get scalded in mischievously working them. This would seem to point to the necessity for having such appliances under the control of some person, such as a shopkeeper; and then, the spontaneity of the thing being wanting, the merit of the invention would not be so great. Any shopkeeper could sell hot water, without the intervention of an automatic machine, if there were a demand for it.

I have several times animadverted on the folly of endeavouring to provide electric current by means of water power, particularly in a country like Scotland, where streams often become frozen. Fort William is the only place I know of where such a system is in operation. There has not been, since it was started, an opportunity of testing my theory. Another drawback to the Fort William installation recently revealed itself, when, on account of a heavy gale of wind, the overhead wires were so much damaged that it was found to be impossible to light the arc lamps that night. I understand that the gas-works are to be closed at the end of the current month; and as the town will then be entirely dependent upon the electricity supply station for its public and private lighting, it is to be hoped that there will be no more gales, or even frosts, to jeopardize the service. The gas-works are the property of Mr. Hugh Mayberry, land valuator, of Glasgow, who purchased them three years ago from the Company who then owned them. They are very small, only producing about 1½ million cubic feet of gas a year. The site has been scheduled by the West Highland Railway Company, in connection with the extension of their railway to Ballachulish.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Jan.* 8.

Sulphate of Ammonia.—The year has opened with an active market; and good business has been done—the closing quotations being £9 5s. to £9 7s. 6d. per ton, delivered f.o.b. at the ports. In the early part of the week, prices current at the close of 1897 were freely accepted; but the demand being well sustained, makers have since been able to place all ready parcels at advancing prices. A pleasing feature in the business has been the great amount of buying done by consumers; and continued large direct inquiry gives promise of further improvement. In the forward position also, makers have advanced their ideas; but so far buyers hesitate about following. Some premium has been paid for January and February delivery. For delivery f.o.b. Leith, January-June, makers now ask £9 10s.; and London makers have withdrawn as sellers.

Nitrate of Soda is firm at 7s. 6d. per cwt. for good, up to 7s. 7½d. for fine quality.

LONDON, *Jan.* 8.

Tar Products.—With the turn of the year, the hoped-for improvement in pitch has not so far manifested itself; and low prices are offered in all positions—the market being the weakest in London. Fortunately, many distillers have contracts at rates prevailing a few months ago, or the position would be a very serious one for them, as, even at the prices quoted below, sales are not easy to effect. Benzols are still neglected; and excepting speculative purchases, no business is being done. It is thought by some that this market has touched bottom, and that better prices will obtain. Should any important sales be made for enriching gas, the position might be at once relieved, as happened only in the spring of last year, when a large quantity was taken out of the market at a low price for gas purposes. There is no change in other products; carbolic acid being still firm with eager buyers, while anthracene is steady at the Committee's rates.

Average market prices may be taken as: Tar, 13s. to 17s. 6d. Pitch, 15s. to 18s. 6d. Benzols, nominal, 90's, 1s. 5d.; 50's, 1s. 6d. Toluol, 1s. 9d. Solvent naphtha, 1s. 7d.; crude, 30 per cent., naphtha, 7½d. Creosote, 2¼d.; liquid, 2¼d. Heavy oils, 40s. to 50s. Carbolic acid, 60's, 2s. Naphthalene, 50s. to 60s.; salts, 30s. Anthracene, "A quality," 5½d.; "B," 4d. to 4½d.

Sulphate of Ammonia continues to improve. Business is reported at £9 5s. to £9 7s. 6d., less 3½ per cent. at all ports; while for the early spring delivery, 5s. per ton more is being asked.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—Even now that pits have got into full work, there is no real improvement in the position so far as trade is concerned; and notwithstanding the diminished output during the holidays, supplies are ample for all requirements, and there has been comparatively very little filled up out of stock. The better qualities of round coal still move off moderately for house-fire purposes; and current prices are not more than maintained at recent quotations—any possibility of an upward move being now practically out of the question. At the pit mouth, best Arley averages 10s. 6d. to 11s. per ton; Pemberton four-feet and seconds Arley, 8s. 6d. to 9s.; and common house coal, 7s. to 7s. 6d. Manufacturing classes of fuel are in indifferent demand; while shipping business has

GAS AND WATER COMPANIES' STOCK AND SHARE LIST

Referred to on p. 73.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 14	10½	Alliance & Dublin 10 p. c.	24—25	..	4 4 0
100,000	10	,,	7½	Do. 7 p. c.	16½—17½	..	4 5 8
300,000	100	Jan. 3	5	Australian 5 p. c. Db.	105—107*	+½	4 13 6
200,000	5	Nov. 11	6½	Bombay, Ltd.	6¾—7¼	..	4 9 7
40,000	5	,,	6½	Do. New, £4 paid	5—5½	..	4 14 6
380,000	Stk.	Aug. 27	12	Brentford Consolidated	300—305	..	3 18 8
240,000	,,	,,	9	Do. New	227—232	..	3 17 7
50,000	,,	,,	5	Do. 5 p. c. Prf.	145—150	..	3 6 8
159,375	,,	Dec. 15	4	Do. 4 p. c. Db. Stk.	134—138	..	2 18 0
220,000	Stk.	Sep. 15	11½	Brighton & Hove Orig.	275—280	+2	4 2 3
208,820	,,	,,	8½	Do. A. Ord. Stk.	203—205	..	4 2 11
933,500	Stk.	Aug. 27	5	Bristol, 5 p. c. max.	130—135	..	3 14 1
420,000	20	Sep. 30	11½	British	56¾—57½	..	3 18 3
50,000	10	Aug. 27	11½	Bromley, Ord. 10 p. c.	25—27	..	4 5 2
71,000	10	,,	8½	Do. 7 p. c.	20—22	..	3 17 3
800,000	10	Oct. 14	6	Buenos Ayres (New) Ltd	9½—10	..	6 0 0
98,122	Stk.	Dec. 30	4	Do. 4 p. c. Db. Stk.	96—98*	−1	4 1 8
150,000	20	July 15	8½	Cagliari, Ltd.	30—32	..	5 3 1
100,000	10	Sep. 30	8	Cape Town & Dis., Ltd.	16½—17½	..	4 11 5
50,000	50	Nov. 2	6	Do. 6 p. c. 1st Mort.	59—61	..	4 18 5
550,000	Stk.	Oct 14	13½	Commercial Old Stock	340—345	..	3 18 3
200,750	,,	,,	10½	Do. New do.	255—260	..	4 0 9
200,750	,,	Dec. 15	4½	Do. 4½ p. c. Db. do.	154—157	..	2 17 4
800,000	Stk.	Dec. 15	12	Continental Union, Ltd.	250—255	..	4 14 1
200,000	,,	,,	9	Do. 7 p. c. Prf.	213—218	..	4 2 7
51,600	Stk	Aug. 27	14	Croydon A 10 p. c.	315—320	..	4 7 6
163,400	,,	,,	11	Do. B 7 p. c.	252—257	..	4 5 7
535,000	Stk.	Aug. 13	5½	Crystal Palace Ord. 5 p. c.	138—142	..	3 13 11
60,000	,,	,,	5	Do. 5 p. c. Prf.	140—143	..	3 9 11
486,090	10	July 29	11	European, Ltd.	26—27	..	4 1 6
354,060	10	,,	11	Do. £7 10s. paid	18½—19½	..	4 4 7
5,896,590	Stk.	Aug. 12	12¾	Gaslight & Coke, A, Ord.	313—316	−1	4 0 8
100,000	,,	,,	4	Do. B, 4 p. c. max.	113—118	..	3 7 10
665,000	,,	,,	10	Do. C, D, E, 10 p. c. Prf.	320—325	..	3 1 6
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	150—155	..	3 4 6
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	222—227	..	3 6 1
1,300,000	,,	,,	7	Do. H, 7 p. c. max.	204—209	..	3 7 0
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	319—324	..	3 1 8
476,000	,,	,,	6	Do. K, 6 p. c. Prf.	182—187	..	3 4 2
1,061,150	,,	Dec. 15	4	Do. 4 p. c. Db. Stk.	138—141	..	2 16 9
294,850	,,	,,	4½	Do. 4½ p. c. do.	155—158	..	2 16 11
908,000	,,	,,	6	Do. 6 p. c. do.	205—210	..	2 17 1
70,000	10	Oct. 28	8	Hongkong & China, Ltd.	14—15	..	5 6 8
3,800,000	Stk.	Nov. 11	10	Imperial Continental	215—220	−3	4 10 11
376,400	100	Aug. 3	4	Do. 4 p. c. Dbs. Red.	99—102	..	3 18 5
473,600	Stk.	Aug. 12	3½	Do. 3½ p. c. Db. Stk.	104—107	..	3 5 5

* Ex div.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
75,000	5	Dec. 15	6	Malta & Medn., Ltd.	5½—6	..	5 0 0
560,000	100	Oct. 1	5	Met. of Mel-bourne 5 p. c. Db.	112—114	..	4 7 8
250,000	100	,,	4½	Do. 4½ p. c. Db.	109—111	..	4 1 1
541,920	20	Nov. 11	5	Monte Video, Ltd.	15—16	+½	6 5 0
150,000	5	Nov. 26	8	Oriental, Ltd.	8—8½	..	4 14 1
135,000	5	,,	8	Do. New, £4 10s. pd.	7—7½	..	4 16 0
15,000	5	,,	8	Do. do. 1879, £1 pd.	1½—2	..	4 0 0
60,000	5	Sep. 30	7	Ottoman, Ltd.	4½—5	..	7 0 0
420,000	100	Nov. 2	6	People's Gas 1st M. Bd of Chicago 2nd do.	104—109	..	5 10 1
500,000	100	Dec. 1	6		103—108	..	5 11 1
250,000	10	Sep. 30	10	San Paulo, Ltd.	16—17	..	5 17 3
135,000	Stk.	—	10	Sheffield A.	250—253	..	3 19 0
209,053	,,	—	10	Do. B.	250—253	..	3 19 0
447,427	,,	—	10	Do. C.	250—253	..	3 19 0
5,475,000	Stk.	Aug. 12	5½	South Metrop., 4 p. c Ord	143—146	..	3 11 11
1,416,667	,,	July 15	3	Do. 3 p. c. Db. Stk.	106—109	..	2 15 0
60,000	Stk.	Sep. 15	12	Tottenham and Edmonton A.	285—295	..	4 1 4
60,000	,,	,,	9	Do. B.	205—215	..	4 3 9
182,380	10	Dec. 30	7	Tuscan, Ltd.	13¾—14½*	..	4 16 7
149,900	10	Jan. 3	5	Do. 5 p. c. Dbs. Red.	100—103*	+½	4 17 1
				WATER COMPANIES.			
746,164	Stk.	Dec. 30	10½	Chelsea, Ord.	333—338*	..	3 2 2
150,000	,,	,,	5	Do. 5 p. c. Prf.	177—180*	..	2 15 6
160,000	,,	,,	4½	Do. 4½ p.c. 1 f. Stk., 1875	157—160*	..	2 16 3
175,785	,,	Sep. 30	4½	Do. 4½ p. c. 1 b. Stk.	160—165	..	2 14 6
1,720,560	Stk.	Oct. 14	7½	East London, Ord.	232—236	..	3 3 8
654,740	,,	Dec. 30	4½	Do. 4½ p. c. Db. Stk.	162—165*	..	2 14 6
390,000	,,	,,	3	Do. 3 p. c. Db. Stk.	105½—106½*	..	2 16 4
700,000	50	Dec. 15	7½	G'd Junct'n, 10 p. c. max.	123—127	..	2 19 0
295,000	Stk.	,,	4	Do. 4 p. c. Db. Stk.	147—152	..	2 12 8
708,000	Stk.	Aug. 12	13	Kent	362—367	..	3 10 10
160,000	,,	,,	7	Do. New, 7 p. c. max.	215—220	..	3 3 7
1,043,800	100	Dec. 30	10	Lambeth, 10 p. c. max.	303—308*	..	3 4 10
406,200	100	,,	7½	Do. 7½ p. c. max.	225—230*	..	3 5 2
350,000	Stk.	Sep. 30	4	Do. 4 p. c. Db. Stk.	147—150	..	2 13 4
500,000	100	Aug. 12	13	New River, New Shares	452—457	+2	2 16 10
1,000,000	Stk.	July 29	4	Do. 4 p. c. Db. Stk.	152—155	..	2 11 7
902,300	Stk.	Dec. 15	6	Southw'k & V'xhall, Ord.	165—168	+1	3 11 5
126,500	100	,,	6	Do. do. 7½ p. c. max.	157—162	+2	3 14 1
489,200	Stk.	,,	5	Do. do. 5 p. c. Prf.	175—180	..	2 15 6
1,019,585	,,	Oct. 14	4	Do. 4 p. c. A Db. Stk.	144—147	..	2 14 7
1,155,066	Stk.	Dec. 15	10	West Middlesex	315—320	..	3 2 6
200,000	,,	,,	4½	Do. 4½ p. c. Db. Stk.	162—165	..	2 14 7

* Ex div.

been but moderate. Supplies of common round coal are therefore plentiful, with 6s. 6d. per ton the full average price for inland sales, and surplus lots offering at the ports at low figures, though 8s. to 8s. 3d. per ton remains the general quotation. Engine classes of fuel are scarce at some collieries, owing to the restricted demand for round coal; but where collieries are short of supplies, at their own pits, they have no difficulty in buying in the open market, which is evidence that there is no general scarcity. Prices are only about steady at 3s. to 3s. 6d. per ton at the pit for common, 3s. 9d. to 4s. 3d. for medium, and 4s. 6d. to 5s. for the best qualities; the minimum figures being taken on contracts in any quantity for forward delivery.

Northern Coal Trade.—There has been a continued large demand for coal; but the output is now at its normal volume, and with a fuller supply there is more weakness in the prices. Best Northumbrian steam coals are steady; the demand being above that usual at this season. The price for best qualities is from 8s. 3d. to 8s. 6d. per ton f.o.b.; second qualities, 8s.; and steam smalls, 3s. 3d. Manufacturing coals are very dull. The output of gas coals is very fully taken up, and will of necessity continue so for some time. For occasional cargoes, the price quoted varies from 8s. to 8s. 6d. per ton f.o.b., for best Durham qualities. It is expected by the coalowners that the prices of gas coals under the next contracts will show a very large advance. There is no change in the position of the gas coke trade.

Scotch Coal Trade.—The coal trade has been interrupted by the holidays. While little has been doing, the outlook is regarded as hopeful. The quotations are: Main, 6s. 9d. to 7s. per ton f.o.b. Glasgow; ell, 7s. 3d. to 7s. 6d.; and splint, 7s. 6d. to 7s. 9d. The shipments for the week amounted to 162,084 tons—a decrease of 4895 tons on the preceding week, but an increase of 35,278 tons over the corresponding week of last year. For the whole of 1897, the shipments amounted to 8,211,991 tons—an increase over 1896 of 641,901 tons.

Middlesbrough Corporation Gas-Works Extension Bill.—The opposition which was manifested towards this Bill at the recent statutory meeting of the ratepayers of Middlesbrough has not been ratified by the general body of ratepayers. It may be remembered that the opponents to the measure succeeded in negativing the resolution assenting to its promotion in Parliament; and thereupon Alderman Hugh Bell, the Chairman of the Gas Committee, demanded a poll. This has since been taken; and the result was declared yesterday—the figures being 3000 votes in favour of the Bill, and only 1000 against it.

Longton Gas-Works Extensions.—Mr. H. P. Boulnois, the newly-appointed Inspector of the Local Government Board, held an inquiry at Longton last Friday into an application by the Corporation for sanction to borrow £20,000 for gas-works purposes. The Town Clerk (Mr. G. C. Kent) explained that the object of the Corporation was to afford extensions, and to put the works into a thoroughly efficient state of repair. By this expenditure, it was estimated that they would effect a saving which would very much more than pay the instalments of principal and interest on the loan—in fact, they expected they would be quite £1000 a year to the good. There was no opposition.

The Purchase of Llanfairfechan Water-Works by the Local Authority.—The District Council of Llanfairfechan have received the sanction of the Local Government Board to borrow £10,500 for the purchase of the local water-works, and also permission to obtain the money from Government at 2¾ per cent.

Hull Water Supply.—The Water Committee of the Hull Corporation have decided to defer the construction of the reservoir at Willerby, in regard to which the Water Engineer (Mr. F. J. Bancroft, B.Sc.) lately presented a report, but to carry out certain mains extensions, plans and specifications of which were submitted.

The Proposed Improvement of the Halifax Water-Works.—In the notice given by the Halifax Corporation of their intention to promote a Bill with the object, among other things, of obtaining power to construct new water-works, it was stated that application would be made for authority to purchase compulsorily additional lands so as to improve the Widdop reservoir. It has now been decided to drop this clause.

Another Water Diviner's Fee Disallowed.—At the meeting of the Sleaford District Council on Monday, last week, a letter was received from the Local Government Board with respect to a proposed loan for a water supply at Scredington, in the Sleaford rural district. A water diviner who had been employed charged £5 5s. for his services, and the Local Government Board had previously refused to allow this amount to be included in a loan, and also £65 expenses in connection therewith. They now wrote that they had reconsidered the matter so far as the £65 was concerned, but they could not allow the £5 5s. to be included.

West's Retort-House Machinery.—The South Metropolitan Gas Company have decided to extend the use of stoking machinery at their Old Kent Road station, in a remodelled retort-house; and they have placed an order with West's Gas Improvement Company, Limited, for a complete installation of their latest compressed air machinery, with the necessary coal breakers, elevators, conveyors, &c. An order for stoking machinery has also been received from the St. Helens Corporation, in extension of the system which has been in operation at these works for some years; as well as one from the River Plate Gas Company, Limited, of Buenos Ayres, for a complete installation of machinery.

Proposed Extensions at the Bolton Corporation Gas-Works.—At a recent meeting of the Gas Committee of the Bolton Town Council, the Gas Engineer (Mr. W. Smith) submitted his estimate of the probable expenditure for extensions at the gas-works. He showed that during the next few years £100,000 would be necessary; and the Committee resolved that application be made to the Local Government Board for sanction to borrow this sum, as authorized by the Corporation Act of 1882. At the last meeting of the Town Council, Mr. Holt asked for particulars of the £100,000 proposed to be borrowed for gas-works purposes. Alderman Miles, in reply, said the Committee's borrowing powers were about exhausted, and it was therefore necessary that provision should be made for extensions which would be required during the ensuing few years. If the whole of the £100,000 was not required, it would not be spent. The expenditure, he added, would be in erecting gasholders, laying new mains, providing purifying apparatus, and several other things.

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Ordinary v. Producer Gas for Driving Engines.—At the last monthly meeting of the Uxbridge District Council, there was a long discussion as to the relative merits of ordinary coal gas and producer gas as motive power for the new engines at the sewage works; and it was decided almost unanimously to adopt the former as being the cheaper fuel in this case.

The Aberystwyth Town Council and the Gas-Works.—As already mentioned in the "JOURNAL," the Aberystwyth Gas Company are about to apply to Parliament for additional powers. This proceeding is not to receive the support of the Town Council, who at their last meeting sanctioned expenditure by a Committee in order to obtain the opinion of an expert as to whether or not a basis has been established as to the selling value of gas undertakings; and, if so, what will be the maximum cost to the Corporation if they elect to purchase the Company's works on arbitration terms.

Bilston Gas Company.—The annual meeting of this Company was held on the 3rd inst. Inpresenting the report (which was noticed in the "JOURNAL" for Dec. 21), the Rev. Charles Lee said that it was the most satisfactory one they had ever had. There had been a large advance in the make of gas; and the Directors were glad to be able to propose both an increase in the rate of dividend and a reduction in the price of gas—1 per cent. in the former, and 2d. per 1000 cubic feet from the charge to the small, and 1½d from that to the large consumers. This meant a gift of £485 to the shareholders, and double the amount to the consumers. He regretted the price of coal had risen 3d. per ton, while the selling price of residuals was abnormally low. The report was adopted.

Wages of Gas Stokers at Oldham.—In the minutes of the Gas Committee presented at the meeting of the Oldham Town Council last Wednesday, was a recommendation that an advance in wages of 3d. per shift be granted to the stokers, on condition that the weight of coal carbonized be increased from 63 cwt. per shift (the present quantity) to 66 cwt. Mr. W. Harrop moved, as an amendment, that the advance be given to the men as recommended, but that the condition attached be deleted. It was pointed out that the men had refused the offer of the Committee, but that the withdrawal of the condition would make the proposal equal to a new one. The amendment, however, was rejected by a large majority; and finally the minute was withheld altogether.

The Fatal Explosion at a Hull Tar Distillery.—The inquiry into the circumstances attending the deaths of the five men at the tar distillery of Messrs. Major and Co., of Hull, on the 21st ult., as already reported in the "JOURNAL," closed last Wednesday. The evidence showed that at the time of the explosion the still which burst was being charged with creosote oil. Mr. J. H. P. Major, the Managing Director, said the still was about two years old, and he had never known an accident occur while charging. The cause of the disaster was a matter of pure conjecture. There was a gas-lamp over the still-house gate. Scientific evidence proved the opinion that the ignition of the contents of the still was brought about by some substance inside; but the witnesses were at a loss to say how it took place. The Jury returned a verdict of "Accidental death."

The Sliding-Scale System of Selling Tar.—At last Wednesday's meeting of the Salford Town Council, in reply to questions by Alderman Snape, Mr. Phillips, the Chairman of the Gas Committee, defended the present method of selling tar according to a sliding scale, regulated by the market price. He stated that the financial results were now much more satisfactory than when the tar was sold in the open market.

Running Gas Plant Closely at Rotherham.—The necessity for the extensions now in progress—too slowly to be of use this winter—at the Rotherham Gas-Works was demonstrated in a very forcible manner at Christmas; and the result has been a crop of complaints which the Chairman of the Gas Committee (Mr. G. Gummer) has had to deal with in the Town Council. The fault really lies with those who are responsible for the inadequate condition of the plant. The new Manager (Mr. F. A. Winstanley) had a by no means pleasant time; for not only had he to reduce the pressure 6-10ths to meet the heavy demand upon him, but on the 24th ult. he was within a few hours of exhausting his stock of gas. He had serious thoughts of putting out the lights in the public lamps; but his Chairman begged him not to do so, as there would be such an outcry in the town. To make matters worse, there was a heavy fog on at the time. At the Town Council meeting at which the foregoing facts came out, Mr. Gummer reminded the members of what was said twelve months ago as to the necessity for the extensions; and the reminder must have been unpleasant to anyone who was then disposed to vote against them.

The Birkenhead Corporation and the Supply of Water Gas.—At the monthly meeting of the Birkenhead Town Council last Wednesday, Alderman Bloor, in moving the adoption of the minutes of the Gas and Water Committee, said the proportion of coal gas in the mixture now supplied was 68, and water gas 32 per cent. Referring to numerous complaints about the illuminating quality of the gas, he said it was never higher nor better than it had been during the past month, and the causes of any defects must be looked for in the fittings. A memorial was read from 241 ratepayers and residents (including twelve medical men) in the neighbourhood of the gas-works, urging immediate attention to the gas supply, which it was alleged caused obnoxious smells and serious injury to health. A member stated that similar complaints were rife in the south end of the town; and another said he had given up gas-stoves in his house because of the obnoxious smells and the ill-effects upon himself and his family. Mr. Laird asked the Committee to furnish an average percentage for the month of the coal and water gas. Alderman Getley stated that, though he resided in the vicinity of the gas-works, he had no complaints to make, either of smells or anything else, since the introduction of water gas. Alderman Bloor said that on the highest scientific opinion there was no harm in water gas, and there was really one-third less smoke than when coal gas alone was supplied from the works. He reminded the Council that though the Gas Committee had promised to keep the proportion of water gas to one-third, as nearly as possible, they did not commit themselves to this proportion. He had no doubt the Committee would be willing to supply more frequent reports as to the proportions of coal and water gas supplied to the town. Ultimately the memorial was referred to the Committee.

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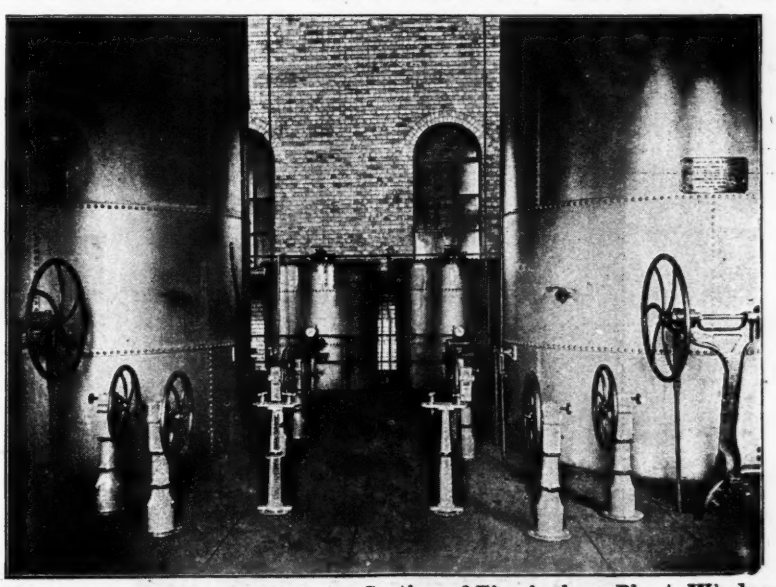

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Insurance of Employees at the Colne Gas-Works.—As the result of the recent fatality at the Colne Gas-Works, as recorded in the "JOURNAL" for the 7th ult., the Corporation, on the recommendation of the Gas Committee, have decided to insure against accident all their employees in receipt of weekly wages, and to pay the premiums.

Gas Wanted for a New Lancashire Watering-Place.—The ratepayers in the recently formed town of Fairhaven, which lies between Lytham and St. Anne's-on-the-Sea, on the Lancashire coast, have memorialized the Lytham Urban District Council for a supply of gas; and at the last meeting of that Authority the matter was considered. It was decided to obtain information as to the practice prevailing in other districts, though several members were in favour of the ratepayers in Fairhaven being supplied with gas forthwith.

The Whitchurch District Council and the Gas-Works.—At their meeting last Tuesday, the Whitchurch District Council decided to acquire the gas-works, in respect to which additional powers are to be asked from Parliament by the Gas Company next session, at a cost of £34,500. The scheme is one with which the ratepayers generally are said to be in accord, as the concern has paid the original shareholders very good dividends. The Council anticipate that in their hands the income will be sufficient to pay off the principal and interest of the loan, besides providing a considerable margin of profit to go in reduction of the rates.

The Public Lighting of Liverpool.—At the meeting of the Liverpool City Council last Wednesday, the estimates of expenditure in the various departments of the Corporation during the current year were presented. Those of the Lighting Committee showed that there will probably be needed for the old city £37,939, of which amount £28,418 is for public lighting, including gas, maintenance, and wages of lighters. This is in regard to 11,172 lamps; but in addition there are 133 electric lamps, for which the estimated charge is £2883. For the added areas the sum of £6216 is specified. The total expenditure of the Gas and Lighting Department is put down at £49,746.

Death from Coal Gas Poisoning.—At Kensington, last Tuesday, Mr. Drew held an inquiry with reference to the death of Mrs. Amelia Rosenstreich, 54, the wife of Mr. Nathaniel Rosenstreich, who was found dead in her bedroom the previous Sunday morning, at No. 44, Cambridge Gardens, North Kensington, as the result of coal gas poisoning. Mr. Rosenstreich said his wife had been drinking very heavily; and, in consequence of her habits, they occupied separate apartments. He heard her drag herself up to her room on Saturday night, and soon afterwards his daughter heard sounds as of someone falling; but they listened and came to the conclusion that it was next door. The following morning he was called by the servant and found his wife dead on the floor of her room. There was a strong smell of gas, and the burner was turned on. The windows were closed, and also the register of the stove. The servant deposed that the deceased lived on happy terms with her husband, but stated that they all kept away from her when she was intoxicated. Medical evidence showed that death was due to coal gas poisoning; and the Jury returned a verdict of "Accidental death."

The Fatal Gas Explosion at Leicester.—An inquiry was held at Leicester last Thursday into the circumstances attending the death of Miss Rose Frances Murden, a professional nurse, which took place on the evening of the 1st inst., as the result of an explosion of gas in the house of a local solicitor where she was engaged. No evidence was forthcoming as to the primary cause of the leakage of gas; and the Jury returned a verdict of "Accidental death."

New Joint-Stock Company.—The International Lighting Association, Limited, was registered in Edinburgh last week, to acquire the undertaking of the Colonial Lighting Syndicate, and to carry on the general business of a gas company. The capital is £100,000; divided into 50,000 preference shares of £1 each, and 50,000 ordinary shares of like nominal value. The Directors are, Mr. J. Hepworth, of Edinburgh; Mr. W. S. Haldane, W.S., of Edinburgh; Mr. J. Dempster, of Newton Heath, Manchester; and Mr. W. H. Cowan, of London. The registered office of the Company is at 28, Frederick Street, Edinburgh.

The Blackburn Gas-Works' Employees and their Wages.—The Sub-Committee of the Blackburn Town Council appointed to consider the application of the gas-works employees for an advance in wages, recommended that labourers should be paid at the rate of 3½d. per hour; pipe layers and bottom men, 6d.; gangers, when in charge of twelve men or more, 6½d.; rammers, 5½d.; and tar boilers, 5½d. The Sub-Committee could not see their way to agree to the demand made for an increase in the wages of the wheelers and firemen, beyond an extra 3d. per day to those who are engaged on the old retorts; making their pay 4s. 3d. a day. At the last meeting of the Town Council, Alderman W. Thompson said they were paying £1000 a year more in wages than was the case at Bolton. On a vote being taken, the recommendations of the Sub-Committee were approved. Only four members voted against them; being of opinion that the firemen ought to have an advance.

A Proposed Conciliation Board for Gas Workers' Disputes at Newcastle and Gateshead.—A proposal has been made to form a Conciliation Board to arbitrate upon questions affecting the Newcastle and Gateshead Gas Company and their workmen. A report submitted by the Town Improvement Committee at a meeting of the Gateshead Town Council on Wednesday contained a letter from the Deputy-Chairman of the Company in reference to the subject. It stated that the Conciliation Board had been practically arranged; but before the lamplighters gave their final assent to the scheme, they required to know whether future questions as to their wages would be settled by the Board or the Corporations. He had, therefore, been requested to ask whether, in the event of the Board being established, the Gateshead Corporation would be willing to remit to the Board all questions relating to the wages of the lamplighters in their district, and agree to accept their decision thereupon. The Committee recommended the Council to approve of the proposition for the foundation of the Conciliation Board for a term not exceeding three years from the 1st inst. upon condition that the provisions be made for the Council being represented at all meetings of the Board, when matters affecting the interests of the Council were under consideration. The report was adopted.

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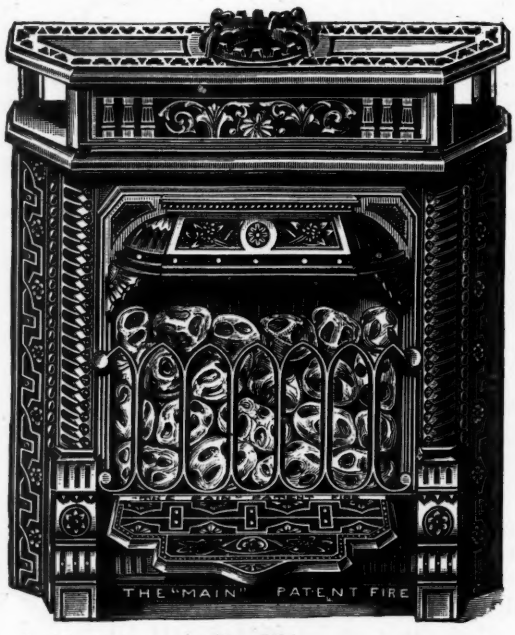

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Reduction of the Water-Rate at Sheffield.—Our readers may probably remember that, after the accident to the Dale Dyke reservoir at Sheffield, the Water Company obtained power by a Special Act to add 25 per cent. to the water-rates, to defray the attendant expenses. This addition has been in force since 1864; but it has now been reduced by one-half. The Water-Works Superintendent (Mr. W. Terry) has prepared tables showing how the reduction will affect all classes of dwelling-houses. The case of houses of £7 and less than £8 annual rental may be taken as a good example. Under the Company's original Act, the charge was 8s.; by the Special Act it was raised to 10s.; and the Corporation have now brought it down to 9s. The annual saving on a house rated between £70 and £100 will be 7s. 6d.

The Price of Gas at Norwich.—The Directors of the British Gaslight Company have decided to reduce the price of gas in Norwich, from the 1st inst., from 3s. 6d. to 3s. per 1000 cubic feet net. "This decision" (says the "Norfolk News") "is a cheering piece of intelligence. We will not stay to inquire how far the advance of electricity has influenced the Company in their determination to cut down the price of the less powerful illuminant. Rather would we draw attention to the fact that the reduction, which, by the way, means a present of £6500 a year to Norwich, synchronizes with the appointment of the new local Manager. Mr. Young came to this city with the reputation of a man who believes in cheap gas. When he was appointed Manager of the same Company at Hanley, the price in that town stood at 3s. 6d. Before he left, it had been reduced to 2s. 3d. Hanley, it must be remembered, is situated in the centre of a big coal district; and what is possible in Staffordshire may be impossible in the capital of Norfolk. But it is evident that the new Manager means business; and if he gets more of it, it is within the bounds of possibility that another 6d. may go by the board before long. As it is, the householders of Norwich—rich and poor alike—have received a welcome Christmas box from a most unexpected quarter."

Proposed Improvement in the Water Supply of Goole.—In connection with a paragraph appearing in our "Legal Intelligence," it may be stated that the question of improving the water supply has lately engaged the attention of the Goole District Council. It was decided that the Chairman, the Clerk, and the Chairman of the Gas and Water Committee should interview Mr. De Rance, with a view to ascertaining whether it is possible to improve the present supply, or whether the Council must eventually go to another source for water. It was further resolved to abolish the dual control of the works by a Sub-Manager and a Consulting Engineer, and to appoint a Manager.

New Water Scheme for Pembroke Dock.—The Local Government Board have approved of the plans of what is known as the Milton Valley water scheme for the supply of Pembroke Dock and the Government Dockyard, and have authorized the Town Council to borrow £23,300 for carrying out the works. The Corporation applied for permission to borrow £28,000, the amount required to complete the works. The Engineer of the scheme (Mr. F. Beesley, Assoc.M.Inst.C.E.) has suggested to the Committee that probably the Board refrained from sanctioning the whole of the money on the ground that, by so doing, they would, when the loan of £15,000 sought for constructing the projected sewerage works in the town is taken into consideration, be permitting the Council to exceed the limit of their statutory borrowing powers. However, no difficulty will, he says, be occasioned, because, when the pumping-house and reservoir at Milton have been completed, the Council can mortgage them for three-fourths of their value; and thus raise the funds necessary for finishing the works.

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WANTED, a Gas-Fitter.
For Particulars, apply to the MANAGER, Gas-Works, Halesowen, near BIRMINGHAM.

STOKER wanted at a Country Gas-Works. Must be used to Shovel Charging and Exhauster. Wages, 25s. per week.
Address C. W. GRIMWOOD, Gas-Works, Sudbury, SUFFOLK.

WANTED, a Draughtsman, thoroughly accustomed to designing and detailing Gas Apparatus.
Apply, stating Age, Experience, and Salary required to No. 2985, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, an experienced Main and SERVICE LAYER. One capable of Erection of all Gas-Works Plant. Permanent Engagement to a steady and competent Workman.
State (by letter) References and Wages expected to No. 2987, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a Gas Company on the South Coast, a competent METER INSPECTOR, accustomed to both Ordinary and Prepayment Meters. Must be of good address.
Particulars of Experience and Wages desired, to be addressed to No. 2989, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, an experienced Man to take CHARGE of the INCANDESCENT GAS-LIGHTING DEPARTMENT of the Sheffield United Gaslight Company. He must be fully capable, and be responsible to the General Manager for the effective placing of these Lights in the most suitable positions.
Apply, by letter, stating full Particulars, to the GENERAL MANAGER, Sheffield United Gaslight Company, Commercial Street, SHEFFIELD.

WANTED, immediately, an experienced Man to inspect Services, read Meters, tap Water-Mains under pressure with Morris's Patent Tapping Tackle, lay Mains and Services, and do general Mechanical Work and Repairs of a Water-Works Company. Wages 20s. to 30s. a week. First-class References absolutely necessary.
Applications and References to be sent to Mr. A. HAROLD RUSTON, Secretary, Newmarket Water-Works Company, Limited, NEWMARKET.

A PROVINCIAL Gas Company near London (make 20 millions) require the services of a first-class WORKING FOREMAN, to take charge of the Works during the absence of the Manager. He must be a good Mechanic, used to the general work of a Gas-Works and the supervision of Men. One who has filled a similar situation will be preferred.
Apply, by letter, stating Wages required, and giving References, to No. 2983, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

CITY OF LEEDS.

THE Gas Committee require the services of a SUPERINTENDENT of the MAINS and SERVICES DEPARTMENT. Applicants must possess a thoroughly practical knowledge of Main and Service Laying and the Distribution of Gas.
Salary, £250 per annum.
Applications, stating Age and Experience, with not more than three recent Testimonials, and addressed to the undersigned, endorsed "Superintendent of Mains," will be received not later than Monday, Jan. 17.
Canvassing members of the Corporation will disqualify Candidates.
JNO. HARRISON,
Town Clerk.
Dec. 24, 1897.

TO GAS PLANT MANUFACTURERS & OTHERS.

GENTLEMAN, with established connection among English and Foreign Gas Companies, and taking larger Offices than he requires in East India Avenue, Leadenhall Street, could arrange to ACCOMMODATE A MANUFACTURER when in London, or RECEIVE and FORWARD LETTERS, &c. Reasonable terms. Highest References.
Address No. 2992, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS CARBON Wanted, not less than 4-Ton Loads.
Apply to the BRIMINGTON CARBON COMPANY, Sowerby Bridge, YORKS.

GAS-PUMP for Sale, horizontal, one Steam Cylinder, 18-inch bore, and two Gas Cylinders, 17½-inch bore, all 24-inch Stroke, on massive Bed-Plate, with heavy Fly-Wheels. Very strong. First-Class Make. Not much used.
Apply, by letter, to No. 2878, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED Carbon. State Price for 4-ton Lots, delivered at nearest Station.
Address No. 2960, care of Mr. King, 11, Bolt Court FLEET STREET, E.C.

FOR SALE—300 14-in. Street-Lanterns, with Cradles, in good condition. Reasonable offers will be considered.
Apply to the ENGINEER and MANAGER, Brentford Gas Company, High Street, BRENTFORD.

FOR SALE—Second-hand Gasholder, in good order, 24 ft. by 10 ft., three Columns, Six Guide Rails, Valves, and Outlet and Inlet Pipes complete.
BATHGATE GASLIGHT COMPANY, BATHGATE, N.B.

EXHAUSTER, in perfect order, 25,000 cubic feet per hour, with two Valves and Connections, £35.
GASHOLDER and IRON TANK, 9000 cubic feet capacity, nearly new, £165 f.o.r.
Address No. 2984, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

THE Aylesbury Gaslight and Coke Company have FOR DISPOSAL a Set of Four PURIFIERS, 12 ft. by 12 ft. 4 ft. 6 in. deep, with Centre-Valve, 12-inch Connections and Lifting Apparatus complete. Good condition.
Particulars can be obtained from GEORGE LANE, Manager, Gas-Works, AYLESBURY.

FOR SALE—A Modern Sulphate of AMMONIA STILL, built by Messrs. R. & J. Dempster, Manchester, 1893, with separate Liming Compartment. Capacity, with ordinary Liquor, 5000 to 6000 lbs. of Sulphate per day.
For further Particulars, apply to the BRYMBO STEEL COMPANY, LIMITED, near WREXHAM.

FOR DISPOSAL, BY TENDER.

THE Professional Library of the late Mr. F. T. C. Linton, of Leith, consisting of about 160 Volumes, all in condition equal to new.
The Books comprise Volumes of the "Journal," "Engineer," "Engineering," Transactions of various Societies, and Miscellaneous Works on Gas and other Engineering Subjects. A full list can be inspected at the Office of the "JOURNAL."
Tenders for the Books will be received up to Jan. 15, addressed to No. 2977, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WOKINGHAM CORPORATION.

THE Gas-Works Committee of the Cor- poration of Wokingham are prepared to receive TENDERS for the execution of a CONCRETE GAS-HOLDER TANK, 68 feet in diameter and 16 ft. 6 in. in depth, according to the Drawings and Specifications which are to be seen at the Gas-Works Offices at Wokingham, copies of which may also be obtained on application to the Engineer, Mr. H. E. Jones, Gas-Works, Harford Street, Stepney, E.
Tenders, marked on the outside, to be sent to the Offices of the Committee not later than Twelve o'clock on the 27th of January, 1898.
The Committee will not be bound to accept the lowest or any tender.

THE Gas Committee of the Corporation of Heywood are prepared to receive TENDERS for the supply of FIRE-CLAY GOODS.
Specification, Quantities, and Form of Tender may be obtained upon application to Mr. W. Whatmough, Gas Manager.
Contractors tendering for this work must pay their workpeople at least the Standard or Trade Union Rate of Wages, and observe the Trade Conditions which attach to the various kinds of work for which the Tender is sent in.
Tenders, endorsed "Fire-Clay Goods," to be sent to me not later than Tuesday, the 18th of January, 1898.
By order,
J. H. BALDWICK,
Town Clerk.
Municipal Buildings, Heywood,
Dec. 31, 1897.

TO GASHOLDER MAKERS.

THE Directors of the Castlebar (Co. Mayo) Gas Company, Limited, invite TENDERS for the erection of a new GASHOLDER at their Works. Diameter of Holder, 30 feet; and the depth at sides, 12 feet.
The Firm whose Tender may be accepted will be required to cut out the old Holder.
Specification and Drawings requested from the Firms sending Tenders.
The Directors do not bind themselves to accept the lowest or any Tender.
Tenders to be lodged with the Secretary on or before the 25th inst.
Dated this 1st day of January, 1898,
J. SHERIDAN,
Secretary.

WORTHING GAS COMPANY.

CAST-IRON PIPE CONTRACT.

TENDERS invited for the supply and delivery, at Worthing Station, of 1200 yards of 10-inch CAST-IRON COMMON SOCKET PIPES, in 9-feet lengths, of standard weight per yard, and 1100 yards of 12-inch ditto; also for a number of SPECIALS, as per schedule, to be supplied.
Tenders, endorsed "Tender for Pipes, &c.," to be sent to W. F. Verrall, Esq., Secretary, on or before Wednesday, the 26th of January, at per ton. The Pipes all to be coated.
W. A. WALKER,
Engineer and Manager.
Gas-Works, Worthing,
Jan. 5, 1898.

MARKET HARBOROUGH GAS COMPANY, LTD.

WANTED, Tenders for surplus Tar produced up to Dec. 31 next.

Tenders, endorsed "Tar," to be sent to the undersigned.

J. FRYER.
Manager.

Jan. 7, 1898.

TENDERS FOR GAS COAL.

THE Magistracy of Copenhagen are prepared to receive TENDERS for the supply and delivery of 110,000 Tons of best GAS COAL during the Year 1898, from April to the end of December.

The Magistracy reserve to themselves the right to divide the Contracts between two or more Contractors.

Further Information and Conditions for the delivery may be obtained on application to the Lighting Department of Copenhagen, Vestre Boulevard, Copenhagen V.

The Tenders (sealed) to be sent to the Magistracy of Copenhagen, Fourth Division, before Jan. 14, 1898, Twelve o'clock, at which time the Tenders will be opened in the presence of the parties tendering who are in attendance.

THE MAGISTRACY OF COPENHAGEN.

Dec. 20, 1897.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held MONTHLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by Auction of Gas and Water Stocks and Shares under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. Alfred Richards's Offices, 18, FINSBURY CIRCUS, E.C.

By order of the Directors.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

SALE OF £11,701 ORDINARY STOCK.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, E.C., on Tuesday, Jan. 25, at Two o'clock, in Lots,

£11,701 OF "C" CAPITAL STOCK,

Ranking for a Standard Dividend of 7 per cent., subject to the Sliding Scale—the last Dividend on similar Stock having been at the rate of 9 per cent.

Particulars at the COMPANY'S OFFICES, in Willoughby Lane, TOTTENHAM; of Messrs. MERRIMAN, PIKE, and MERRIMAN, Solicitors, 25, AUSTIN FRIARS, E.C.; and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors.

LOWESTOFT WATER AND GAS COMPANY.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, E.C., on Tuesday, Jan. 25, at Two o'clock, in Lots,

1000 ADDITIONAL ORDINARY £10 SHARES,

in the above Company, ranking for a Maximum Dividend of 7 per cent.—the last Dividend on similar Shares having been at the rate of 5¼ per cent.

Particulars may be obtained of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors.

SOUTHEND WATER-WORKS COMPANY.

NEW ISSUE OF £5000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell the above BY AUCTION, at the Mart, E.C., on Tuesday, Jan. 25, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors.

£3900 FOUR PER CENT. PERPETUAL DEBENTURE STOCK OF THE

ASCOT DISTRICT GAS COMPANY.

MR. ALFRED RICHARDS will Sell the above BY AUCTION, at the Mart, E.C., on Tuesday, Jan. 25, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors.

GUILDFORD GASLIGHT AND COKE COMPANY.

SALE OF £5000 ORDINARY STOCK.

MR. ALFRED RICHARDS will Sell by AUCTION, at the Mart, E.C., on Tuesday, Jan. 25, at Two o'clock, in Lots, £5000 of ORDINARY STOCK in the Guildford Gaslight and Coke Company, ranking for a Standard Dividend of 5 per cent. per annum—the last Dividend on similar Stock in the Company having been at this rate, free of Income-Tax.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

TAUNTON GASLIGHT AND COKE COMPANY. BRIGHTON AND HOVE GENERAL GAS COMPANY.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, E.C., on Tuesday, Jan. 25, at Two o'clock,

£850 "A" STOCK, 18 £5 SHARES, and £1030 NEW STOCK, in the Taunton Gaslight and Coke Company; and

£300 ORIGINAL STOCK in the Brighton and Hove General Gas Company.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

CITY OF LEEDS.
(GAS DEPARTMENT.)

THE Gas Committee of the Leeds City Council are prepared to receive TENDERS for the supply of FIRE-CLAY RETORTS, FIRE-BRICK LUMPS, FIRE-BRICKS, and FIRE-CLAY.

Particulars as to quantity, with Form of Tender, may be had on application to the undersigned.

Tenders, addressed to the Chairman of the Gas Committee, Municipal Offices, Leeds, will be received not later than Wednesday, the 19th of January, endorsed "Tender for Fire Goods."

The Committee do not bind themselves to accept the lowest or any tender.

R. H. TOWNSLEY,
General Manager.

Municipal Offices, Leeds,
Jan. 6, 1898.

GAINSBOROUGH URBAN DISTRICT COUNCIL.

TO ENGINEERS AND CONTRACTORS.
PUMPING MACHINERY, BOREHOLE No. 1.

THE Gainsborough Urban District Council invite TENDERS for new PUMPING MACHINERY (Pumps, Gearing, and Condenser), to be fixed at their No. 1 Borehole.

Drawings and Specifications may be seen, and full Particulars obtained, at the Office of the Engineer, Mr. Percy Griffith, Assoc.M.Inst.C.E., 55, Parliament Street, Westminster, between the hours of Eleven and Four, or at the Offices of the Urban District Council, Gainsborough.

Sealed Tenders, addressed to the undersigned, must be delivered at this Office not later than Noon of the 2nd day of February, 1898.

The Council do not bind themselves to accept the lowest or any tender.

By order,
DECIMUS M. ROBBS,
Clerk.

Lord Street, Gainsborough,
January, 1898.

GAS PURIFICATION BY HYDRATED OXIDE.

THIS Material is of full Strength, and Exceptional Activity. It is specially prepared to minimize Back-Pressure; and will be supplied on Hire, or Sold, on the most favourable Terms.

SPENT OXIDES containing Blue, also CRUDE FERRO-CYANIDE PRODUCTS, either PURCHASED or EXCHANGED for FRESH OXIDE.

MANCHESTER OXIDE COMPANY, LTD.,
CANAL ST., MILES PLATTING, MANCHESTER.

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD

BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY.

RAVENSTHORPE, NEAR DEWSBURY.

THE

"ETNA" FIRE & HEAT RESISTING

CEMENT,

For RETORT PURPOSES, is INVALUABLE.

Sole Manufacturers:

FRED VERITY & SON,

CALL LANE, LEEDS.

Scores of Testimonials received. Write for Particulars.

COKE-BREAKERS,

PRICES REDUCED.

(THOMAS & SOMERVILLE'S PATENT)

New Design, with two Cutting Rollers, making less Breeze than their old pattern.

GEORGE WALLER & CO.,

165, QUEEN VICTORIA STREET, E.C.,

And at STROUD, GLOUCESTERSHIRE.

BATTERSEA POLYTECHNIC, London, S.W.

DAY COURSES IN APPLIED CHEMISTRY FOR TECHNICAL STUDENTS.

Head of Chemical Department—W. A. BONE, D.Sc., Ph.D.

Special Day Courses of Instruction in EXPERIMENTAL CHEMISTRY AS APPLIED TO GAS LIGHTING will be given during the ensuing Term, commencing Jan. 10, 1898. The object of these Courses is to impart a thoroughly scientific training in the special branch of Applied Chemistry; and they are specially suited for Youths who are preparing themselves for positions of responsibility in this particular Industry. The Laboratory is open daily. Special Evening Courses for Artisan Students.

A NEW TECHNICAL DAY SCHOOL for Boys preparing for the Building, Mechanical, or Electrical Engineering Trades will be opened Monday, Jan. 10. Fee: £1 per Term.

For Particulars and Prospectuses of other Schools and Classes apply to the SECRETARY.

BOLDON GAS COALS.

ANALYSIS.

Yield of Gas per ton	10,500 Cubic Feet.
Illuminating Power	16·9 Candles.
Coke	66·7 Coke.
Sulphur	0·86 Sulphur.
Ash	2·04 Ash.

For Prices, &c., apply to

W. H. PARKINSON,

THE HARTON COAL CO., LTD.,

NEWCASTLE-ON-TYNE.

Telegraphic Address: "PARKINSON NEWCASTLE."

LONDONDERRY GAS COALS

FROM THE

MARQUIS OF LONDONDERRY'S COLLIERIES,

COUNTY OF DURHAM.

Available output up to 5000 tons per day. Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by Mr. John Pattinson, F.C.S., F.I.S.

FOR PRICES AND PARTICULARS, APPLY TO

S. J. DITCHFIELD,

SEAHAM HARBOUR, COUNTY OF DURHAM.

HOLMSIDE GAS COALS.

Present Daily Produce over 5000 Tons.

Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton	11,205 Cubic Feet.
Illuminating Power	$16\frac{7}{10}$ Stand. Sperm. Candl.
Coke (of good & pure quality)	13¾ Cwt. per Ton.
Sulphur	A little over 1 per Cent.
Ash	Under 1 per Cent.
Tar	163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor	103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England, and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR PELTON GAS COALS.

Present Daily Produce available 3000 Tons.

Of equal quality to the "Holmside" Coal, and also very largely used by many Gas Companies at Home and Abroad.

Both descriptions are shipped at Tyne Docks, and Dunston Staiths, River Tyne, also at North and South Docks, Sunderland.

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,

HOLMSIDE & SOUTH MOOR OFFICES,

NEWCASTLE-UPON-TYNE.

HEBBURN MAIN GAS COALS.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·4 candles.
Coke . . . . . 68 per cent.

For Prices, f.o.b. Ship or Delivered by Rail, apply to

THE WALLSEND & HEBBURN COAL COMPANY, LTD.
8 Lombard Street,
NEWCASTLE-ON-TYNE.

W. RICHARDSON, Fitter.

JAMES OAKES & Co.,

ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1¼ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts and covers, and rendering leakage impossible.

THOMAS TURTON AND SONS, LIMITED,

SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.

SCREW STOCKS, TAPS AND DIES, SPANNERS, RATCHET BRACES, LIFTING JACKS, ANVILS, VICES, AND ENGINEERS' TOOLS GENERALLY.

LONDON OFFICE:
90, CANNON STREET, E.C.

INCANDESCENT GAS LIGHTING

Has now gained a complete and final Victory over its last and greatest Enemy

VIBRATION,

BY MEANS OF
CLAY'S PATENT
SHOCK-PROOF
Incandescent Burner Fittings

Of which full Particulars may be had from

CLAY & WALMSLEY,

BOLTON, ENGLAND.

Telegrams: "CLAYS, BOLTON."

See "JOURNAL OF GAS LIGHTING," July 7, 1896, p. 19, and Dec. 21, 1897, p. 1365.

EVESON FOR CANNEL

TELEGRAMS:
"EVESON, BIRMINGHAM."

HEATHCOTE GAS COAL.

Rich in Illuminating Power and Yield of Gas. Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.

THE GRASSMOOR CO., LD.,

CHESTERFIELD.

THORNLEY GAS COALS

WORKED BY THE
WEARDALE IRON & COAL CO., LD.
OUT OF THEIR
THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by
Messrs. J. & H. S. PATTINSON, *May 28, 1895*,

Yield of Gas per Ton . . 10,500 Cub. Ft.
Illuminating Power . . 16·9 Candles.
Coke (of good quality) . . 67·5 per Cent.
Sulphur . . . . . 0·58 „
Ash . . . . . 2·73 „

For Price, &c., apply to the
WEARDALE IRON & COAL CO., LD.
QUAYSIDE, NEWCASTLE-ON-TYNE.

Lanemark Coal Co.,

LIMITED.

LANEMARK CANNEL AND GAS COALS.

Quotations and Analysis on Application to

LANEMARK COLLIERY,
NEW CUMNOCK, N.B.

Shipping Ports: All the principal Scotch Ports.

PRICE'S COKE & COAL BARROW

effects a great saving of time, labour, and expense.

For Particulars, Price, &c., apply to Mr. EDWARD PRICE, 119, Queen's Road, FINSBURY PARK, N.

Prices are Reduced.

THE SILICA FIRE-BRICK COMPANY,

OUGHTIBRIDGE, near SHEFFIELD
MANUFACTURE
SILICA BLOCKS, BRICKS, AND CEMENT
OF SUPERIOR QUALITY
FOR GAS-FURNACES.

Trade Mark: "SILICA."

These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their
GREATER DURABILITY,
Strongly recommended where EXCESSIVE HEATS have to be maintained.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for

CANNEL & COAL.

TYNE
BOGHEAD CANNEL.

Yield of Gas per ton . . . . . 13,155 cub. ft.
Illuminating Power . . . . . 38·22 candles.
Coke per ton . . . . . 1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton . . . . . 10,500 cub.
Illuminating Power . . . . . 17·8 candles.
Coke . . . . . 70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·3 candles.
Coke . . . . . 73·1 per cent.

For Prices and complete Analysis, apply to
THOS. W. DANCE & SONS,
COAL OWNERS, NEWCASTLE-ON-TYNE:
OR
E. FOSTER & CO.,
21, JOHN STREET, ADELPHI, LONDON, W.C.

G. & J. HAIGH,

Raven's Lodge Fire-Brick Works, DEWSBURY.

FIRE-BRICKS of the highest Quality, made from Fire-Clay of a most Superior and Refractory Character, suitable for GLASS-WORKS, GAS-WORKS, and BLAST-FURNACES.

WHITE GLAZED AND SALT GLAZED BRICKS, BUFF FACING BRICKS, &c.

For Prices and Analysis, apply as above.

TROTTER, HAINES, & CORBETT,
Brettell's Estate
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Proprietors of
BEST GLASSHOUSE POT & CRUCIBLE CLAY.
Shipments Promptly and Carefully Executed.

London Office: R. Cull, 84, Old Broad St., E.C.

ALEXANDER CAMERON,
GAS AND CANNEL COAL MERCHANT,
48, WEST REGENT STREET,
GLASGOW.

Telephone: Castleford No. 214. | Postal Address: Castleford.
Telegrams: "Silkstone Castleford."

THE SILKSTONE & HAIGH MOOR COLLIERIES, Ltd.
ALLERTON BYWATER, CASTLEFORD.

Steam, Manufacturing, & Gas Coals & Cannel.
Analysis, Contracts, Trial Waggons, and Quotations for Large and Small Orders. Inquiries Solicited.

E. ASQUITH & CO.,
Hydraulic Engineers,
17, Mather Street, Ancoats, Manchester,
Fit up Plants for
Pressing Anthracene, Naphthalene, &c.
Competent Men sent out to erect same. Estimates given.

NEWBATTLE CANNEL.
Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO
THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH, N.B.

ROBERT MARSHALL,
CANNEL COAL MERCHANT,
97, WELLINGTON STREET, GLASGOW.
Prices and Analysis of all the Scotch Cannels on Application.

THE
MAXIM PATENT CARBURETTOR
FOR ENRICHING GAS IN BULK.
Over 50 Maxim Patent Carburettors have now been fixed, capable of enriching
650,000,000
CUBIC FEET OF GAS PER DAY.

Among the Companies supplied are The Gaslight and Coke Company, the South Metropolitan Gas Company, Birmingham Corporation, Manchester Corporation, Rochdale Corporation, Bristol Gas Company, and many other Works, both large and small, where they have been working in some instances for the past **FOUR YEARS.**

More Gas and saleable Coke per ton of Coal Carbonized is produced; saving Capital, Labour, Fuel, Wear and Tear, &c.

The Enrichment is **INSTANTANEOUS** and **PERMANENT.**

The Carburettor is inexpensive, easily fixed, and entirely supersedes the use of Cannel.

SOLE AGENTS FOR REDWOOD & CLOWES' INFLAMMABLE VAPOUR & GAS DETECTORS.

Dealers in Carburine and all other Naphthas for the Enrichment of Gas.

FOR PRICES AND FULL PARTICULARS, APPLY TO
THE GAS LIGHTING IMPROVEMENT COMPANY, LIMITED,
18, DEVONSHIRE STREET, BISHOPSGATE, LONDON, E.C.

MOBBERLEY & PERRY
STOURBRIDGE.
Manufacture & supply best quality of
Gas Retorts (SEGMENTAL, HORIZONTAL, or INCLINED.)
Special Bricks & Blocks for GENERATOR & REGENERATOR FURNACES.
FIRE BRICKS, LUMPS, & TILES, BLUE STAFFORDSHIRE VITRIFIED BRICKS FOR PAVING, &c., &c.
EVERY REQUISITE FOR GAS-WORKS. Retort Setters sent to any part of the Kingdom.
London Agents: Contractors for the erection of Retort-Benches complete.
BALE & HARDY, Gas Engineers and Contractors,
BRIDGE HOUSE, 181, QUEEN VICTORIA STREET, E.C.

WILSON CARTER & PEARSON,

GAS COAL AND CANNEL FACTORS,

Supply to any Railway Station, or for Export, all kinds of Fuel for Gas purposes.

ADDRESS CHIEF OFFICES:

Temple Buildings, 50, New Street, Birmingham.

WILLIAM INGHAM & SONS,

Incorporated with the Leeds Fire-Clay Company, Ltd.,

WORTLEY FIRE-CLAY WORKS,

Near LEEDS,

Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—

1. Smooth interior, preventing adhesion of Carbon.
2. They can be made in one piece up to 10 feet long.
3. Uniformity in thickness, ensuring equal Expansion and Contraction.

PATENT

MACHINE-MADE GAS-RETORTS.

HARRIS & PEARSON,

STOURBRIDGE, ENGLAND,

MANUFACTURERS OF

FIRE-CLAY GAS-RETORTS, FIRE-BRICKS, LUMPS, & TILES of Every Description.

GLAZED BRICKS AND PORCELAIN BATHS.

H. KIRKHAM & CO.

Are now prepared to Tender for **SCRUBBER-WASHERS** fitted with their Patent Basket or Cage, with Improved Washing Surface. It is acknowledged to be the **MOST EFFECTIVE MACHINE** for extracting Ammonia and other Impurities from Coal Gas. It is guaranteed to Purify **20** per cent. more Gas in the same space, and at considerably less cost per Machine. The Baskets and Scrubbing Surface can be readily applied to all the sizes of the Kirkham, Hulett, and Chandler Machines now in use.

Office: 335, MANSION HOUSE CHAMBERS, LONDON, E.C.

WOMBWELL MAIN COMPANY, Ld.,

BARNSLEY.

BEST GAS COAL.

ANALYSIS: 11,390 feet of 17-Candle Gas. Value in Sperm per ton, 686 lbs.

By R. O. PATERSON, C.E.

APPLY

WOMBWELL MAIN COMPANY, LIMITED, BARNSLEY.

Telegrams: "MAIN, WOMBWELL."

LONDON OFFICE

60, QUEEN VICTORIA ST. E.C.

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"ECLAIRAGE LONDON."

TELEPHONE Nº 43.
"HALIFAX EXCHANGE"

GAS ENGINEERS.
CONTRACTORS.
IRONFOUNDERS.

RETORT SETTERS.
FURNACE BUILDERS.
ETC. ETC.

JONAS DRAKE & SON

SOLE AGENTS FOR

HISLOP'S

PATENT REGENERATIVE FURNACES

—FOR—

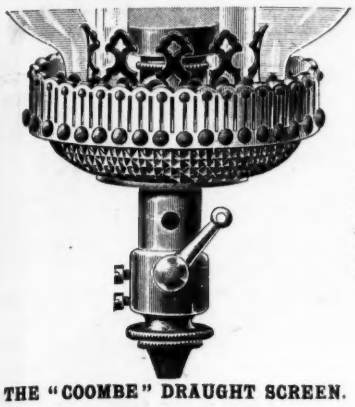
ENGLAND, WALES & ABROAD.

RETORT BENCHES ERECTED COMPLETE WITH OR WITHOUT SPECIAL FURNACES. RESULTS GUARANTEED.

OVENDEN HALIFAX

Designs and Estimates on Application.

GASEOUS FIRING A SPECIALTY.



THE "COOMBE" DRAUGHT SCREEN.
Protection granted,
1896, No. 2075.

THE "COOMBE" DRAUGHT SCREEN FOR INCANDESCENT BURNERS.

ADVANTAGES.

1.—Prevents draughts of cold air from ascending the Chimney, and thereby lengthens the life of Chimney and Mantle.
2.—Prevents attempts to light spills, &c., in Bars and Restaurants, by which many Mantles are destroyed.
3.—Presents an ornamental appearance, which greatly adds to the beauty of the Burner.
4.—Prevents "Lighting-Back," and keeps out dust and dirt.

SOLD EVERYWHERE.

Wholesale of the Patentees,

ALFRED ARCULUS & CO., GLASS MANUFACTURERS, BIRMINGHAM.

"An Incandescent Burner without a Draught Screen is like a Man without a Collar."

COLUMNLESS GASHOLDERS

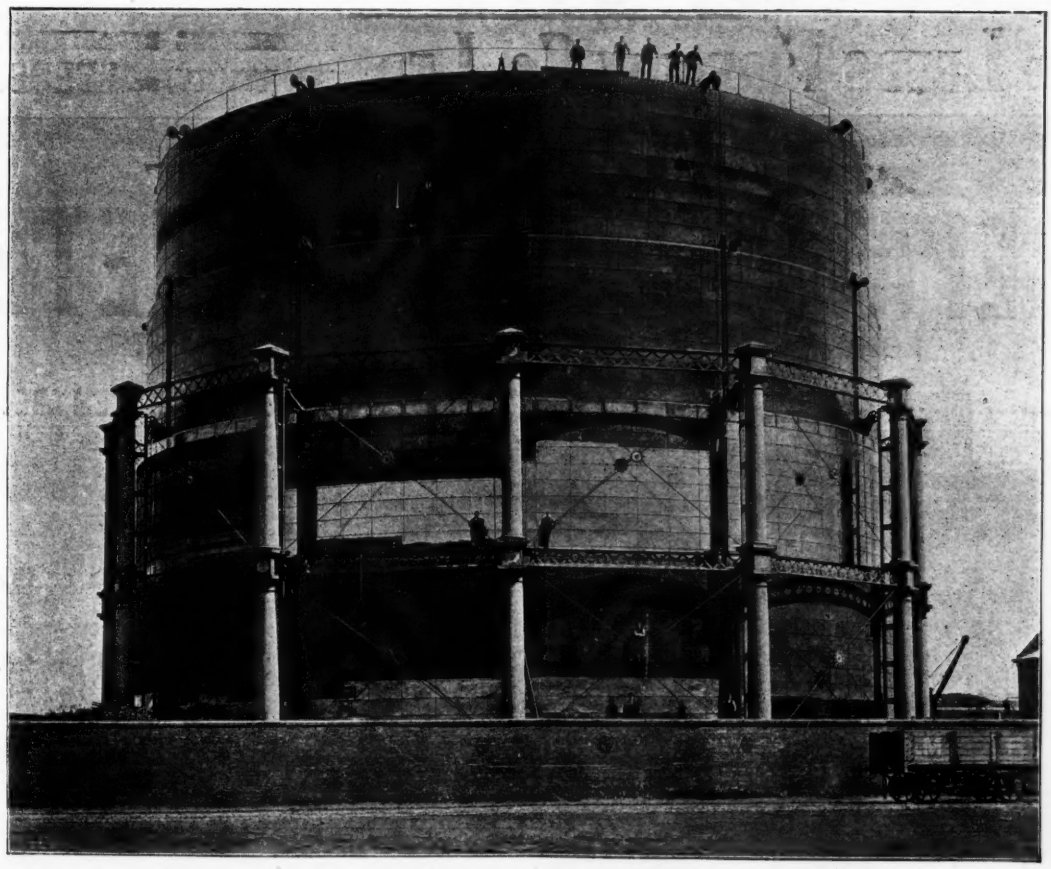
ON

PEASE'S STEEL CABLE SYSTEM.

Great Saving in Cost, and Absolutely Reliable in Working.

These Holders are certified by users to be STEADIER UNDER WIND PRESSURE than Holders with Columns.

INSPECTION INVITED. GREAT SAVING IN WEIGHT; FREIGHTS REDUCED.



FOUR-LIFT GASHOLDER, 120 Feet Diameter, 90 Feet High. TWO LIFTS ADDED ON STEEL CABLES (PEASE'S SYSTEM).
(CABLES ON THREE LIFTS)
WALLASEY URBAN DISTRICT COUNCIL.
(*From a Photograph.*)

Manufacturers and Patentees, Telegrams: "GASHOLDER."

ASHMORE, BENSON, PEASE, & CO., LIMITED,

STOCKTON-ON-TEES.

TELEGRAMS: "FIRECLAY," LEEDS. TELEPHONE No. 612.

COAL and COKE Breakers, Elevators, AND Conveyors.

RETORTS, Bricks, Blocks, Tiles, &c.

ENGINEERS IRONFOUNDERS CONTRACTORS MANUFACTURERS

EVERY DESCRIPTION OF

RETORT SETTINGS AND IRONWORK.

WE GUARANTEE RESULTS.

BUILDINGS, ROOFS.

RE-SETTING RETORTS.

We desire to call attention to our SHALLOW REGENERATIVE SETTINGS, which are comparatively inexpensive to erect, and productive of excellent results. They are specially designed to suit those Retort Houses where for various reasons it is undesirable to excavate to any great depth.

We shall be pleased to furnish Designs and Estimates on application.

THE LEEDS FIRECLAY CO. LTD., ENGINEERING DEPARTMENT, WORTLEY, nr. LEEDS.

THE "TRAFALGAR"

PREPAYMENT GAS-METER

FOR PENCE, SHILLINGS, OR ANY COINAGE.

THE ADVANTAGES OF THIS SYSTEM ARE:

1. Simplicity of Mechanism.
2. Absolute Accuracy.
3. Impossibility of being tampered with.
4. Unaffected by irregularities in shape or thickness of the penny.
5. Can be fixed to any ordinary Wet or Dry Meter.
6. Extra large Money-Box.
7. Price Changer can be altered without otherwise disturbing the Meter.
8. Index showing number of Pennies in the mechanism at any time.
9. Rejection of Half-Pennies certain.

GUARANTEED FOR FIVE YEARS.

FRANK WRIGHT'S PREPAYMENT GAS-METER CORPORATION, Limited,

Telegraphic Address: "Gasometer, London." Manufacturers of Wet and Dry Gas-Meters. Offices and Works: 62, GLENGALL ROAD, S.E. Telephone No. 59 Peckham.

THE

DENAYROUZE LIGHT SYNDICATE, LTD.,

BEG to announce that, having made arrangements for the Manufacture of their **BURNERS** in England, they are **NOW ABLE TO SUPPLY THESE IN ANY QUANTITY.**

These Burners (with Mantles specially made for the Syndicate by the Incandescent Gas-Light Company, Ltd., under the Welsbach Patents) are admitted by all Experts to be the **BEST AND MOST ECONOMICAL LIGHTS FOR LARGE AREAS AND PUBLIC STREETS.**

Press Notices and Opinions from all the leading Gas Managers throughout the Kingdom can be seen on applying to

CHARLES EDWARD MASTERMAN,
GENERAL MANAGER.

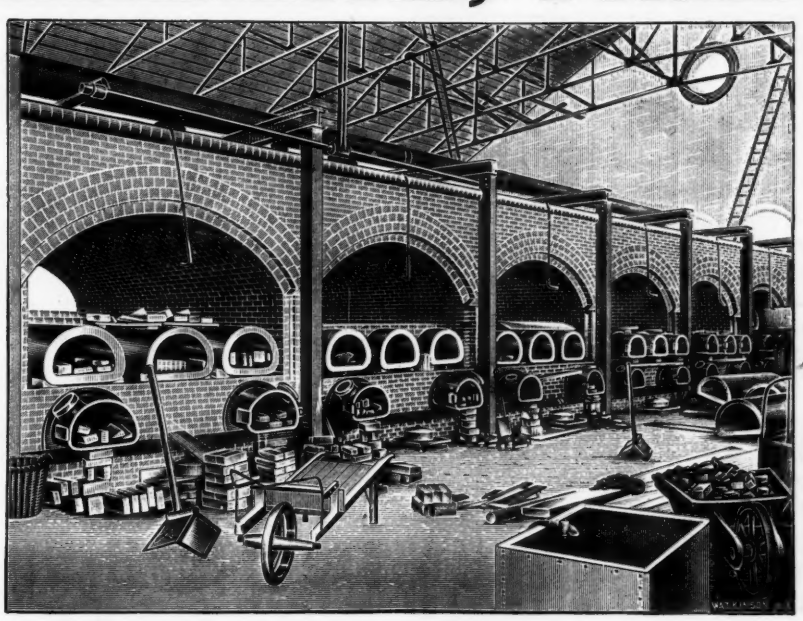
28, VICTORIA STREET, LONDON, S.W.

R. DEMPSTER & SONS,

LIMITED.

ELLAND, YORKS.

DIRECT-FIRED GENERATOR AND REGENERATOR SETTINGS



AND RETORT WORK IN ALL ITS BRANCHES.

REGENERATIVE SETTINGS DURING CONSTRUCTION (From a Photo.).

CONTRACTORS FOR COMPLETE INSTALLATIONS ON HORIZONTAL OR INCLINED SYSTEMS, WITHOUT SUB-CONTRACTING.

BOWENS' Ltd. Successors,
STOURBRIDGE.

MANUFACTURERS OF
BEST FIRE-BRICKS; INCLINED, HORIZONTAL, and SECTIONAL RETORTS; LUMPS, TILES, &c., of every description.
Established 1860.

PETTIGREW'S PATENT
Sulphate of Ammonia Plant
ON THE CONTINUOUS SYSTEM
Is the newest in the Market, and is the outcome of practical experience in Sulphate Making.
Old Systems easily and cheaply converted.
ANY SIZE ERECTED COMPLETE AT HOME OR ABROAD.
Makers of Self-Emptying Saturators.
Write for Particulars, Testimonials, and References to
GEO. PETTIGREW & Co.,
GAS AND CHEMICAL ENGINEERS,
MIDDLESBROUGH-ON-TEES.

The Climax of Regenerative Gas Lighting!!

THE
"VERTMARCHE"
A 280-Candle Power PLAIN IRON LAMP,
CLASS A— 55/-
LIGHT for LIGHT
less than half the price of any other Regenerative Lamp.
Manufactured in England.
HENRY GREENE & SONS,
153 & 155, CANNON STREET, LONDON BRIDGE, E.C.
PARTICULARS AND PRICES FREE. AGENTS WANTED.

PATENT TWISTED TAPER RYMERS & TAPS.

These **Patent Twisted Taper Rymers and Taps** are the best ever made for Gas and Water Service Connections. A true Hole and a correct Thread can be assured. They are easy to work, and will last much longer than straight grooved Taps and Rymers.

THOUSANDS ARE IN DAILY USE.

Also SCREWING-MACHINES, STOCKS and DIES (with Patent Twisted Dies), PIPE-TONGS, and other TOOLS.

Apply for Prices and Particulars to
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ALBION WORKS, HYDE, near MANCHESTER.

ARROL-FOULIS
Patent Automatic Machinery
FOR
DRAWING AND CHARGING GAS-RETORTS.

Full Particulars may be obtained from the Sole Makers,
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[See Illustrated Advertisement, Jan. 4, p. 11.]

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MAKERS OF THE **BIRMINGHAM.**

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WITH PATENT SHADE.

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Extract from the JOURNAL OF GAS LIGHTING, Jan. 8, 1895.

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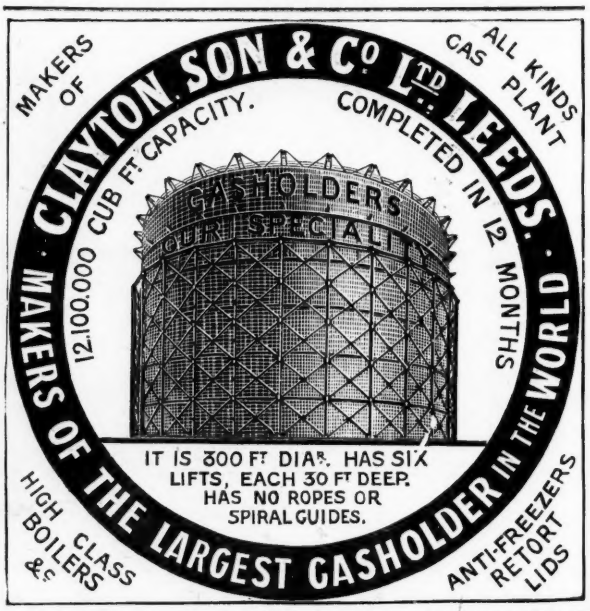
MAKERS OF
CLAYTON, SON & Co LTD LEEDS.
ALL KINDS GAS PLANT
12,100,000 CUB FT CAPACITY.
COMPLETED IN 12 MONTHS
GASHOLDERS OUR SPECIALITY
IT IS 300 FT DIAM. HAS SIX LIFTS, EACH 30 FT DEEP. HAS NO ROPES OR SPIRAL GUIDES.
MAKERS OF THE LARGEST GASHOLDER IN THE WORLD
HIGH CLASS BOILERS &c
ANTI-FREEZERS RETORT LIDS

GIRDERS, ROOFS, & ALL KINDS OF STRUCTURAL IRONWORK.

London Office: 60, QUEEN VICTORIA STREET, E.C.
Telegraphic Addresses: "GAS, LEEDS," "ECLARAGE, LONDON."

HARPER & MOORES,
STOURBRIDGE.

MANUFACTURERS OF
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LUMPS, TILES, AND ALL ARTICLES IN FIRE-CLAY.
Proprietors of Best Glasshouse Pot, Crucible, and other Stourbridge Clays.
MANUFACTURERS OF GLASSHOUSE POTS AND CRUCIBLES OF EVERY KIND.
ESTABLISHED 1826.

JOSEPH CLIFF & SONS,
INCORPORATED IN
THE LEEDS FIRE-CLAY COMPANY, Ltd.
WORTLEY, LEEDS.

LONDON OFFICES & DEPÔTS:
Baltic Wharf, Waterloo Bridge.
WHARVES NOS. 2 & 4, INSIDE G.N.
GOODS YARD, KING'S CROSS, N.
LIVERPOOL:
16, Lightbody Street.
LEEDS:
Queen Street.

MACHINE-MADE RETORTS

Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

RETORTS CAREFULLY PACKED FOR EXPORT.
Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

GODDARD, MASSEY, & WARNER'S
IMPROVED
Sulphate of Ammonia Apparatus.

The most successful and approved Apparatus known up to the present time.

FOR REFERENCES, PARTICULARS, TESTIMONIALS, AND PRICES, APPLY TO

GODDARD, MASSEY, & WARNER,
ENGINEERS,
NOTTINGHAM.

The Apparatus has been supplied to the following Firms—

BURT BOULTON, & HAYWOOD, SILVERTOWN, and ELING.
CHANCE BROTHERS, OLDBURY (FOUR APPARATUS).
RUNCORN SOAP & ALKALI CO., Limited, RUNCORN.
NETHAM CHEMICAL CO., Limited, BRISTOL.
ANIMAL CHARCOAL CO., Limited SHADWELL.
WM. BUTLER & CO., BRISTOL.
KEMPSON & CO., Pye Bridge.

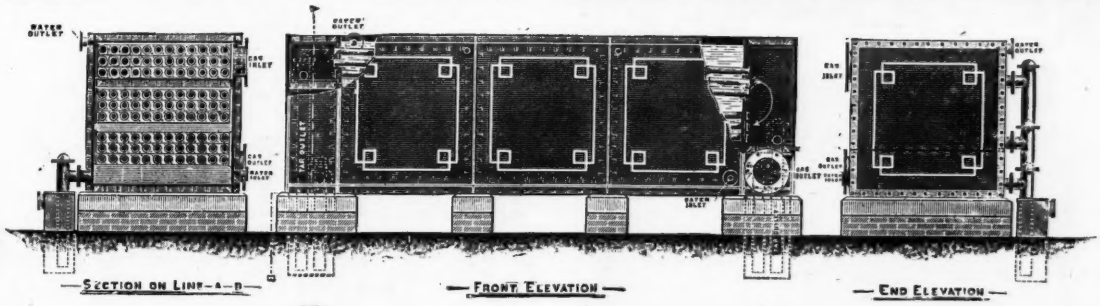
And to the following Gas Companies and Corporations—

ILKESTON.
WIDNES.
HALIFAX.
ALTRINCHAM.
DENTON.
ST. ALBANS.
DUKINFIELD.
NORTHWICH.
HUDDERSFIELD.
BURY.
BRIGHOUSE.
MARKET HARBRO'
PRESCOT.
SOWERBY BRIDGE.
LEICESTER.
DARWEN.
NELSON.
ORMSKIRK.
CHORLEY.
WHITEHAVEN.
CHESTER.
SOUTH SHIELDS.
LEEK.
IPSWICH.
BOURNEMOUTH.
SALFORD.
LUTON.
HAMPTON COURT.

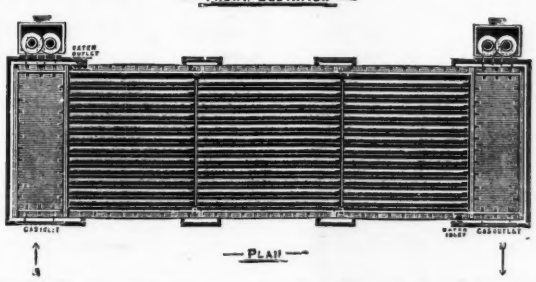
R. & J. DEMPSTER, LTD., GAS PLANT WORKS,

Telegraphic Address:
"SCRUBBER, MANCHESTER."
National Telephone Nos. 54 and 2296.

NEWTON HEATH, MANCHESTER.



IN ACTION.
SLOW-SPEED,
UNIFORM,
EFFECTIVE.



IN DESIGN.
SIMPLE,
DURABLE,
INEXPENSIVE.

WATER-COOLED GAS-CONDENSERS.

R. & J. D., Ltd., have at present in hand, for at Home and the Colonies, Water Condensers equal to **7,250,000** cubic feet per day.

Particulars, Prices, and Testimonials on Application.

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Is the newest in the Market, and is the outcome of practical experience in Sulphate Making.
Old Systems easily and cheaply converted.
ANY SIZE ERECTED COMPLETE AT HOME OR ABROAD.
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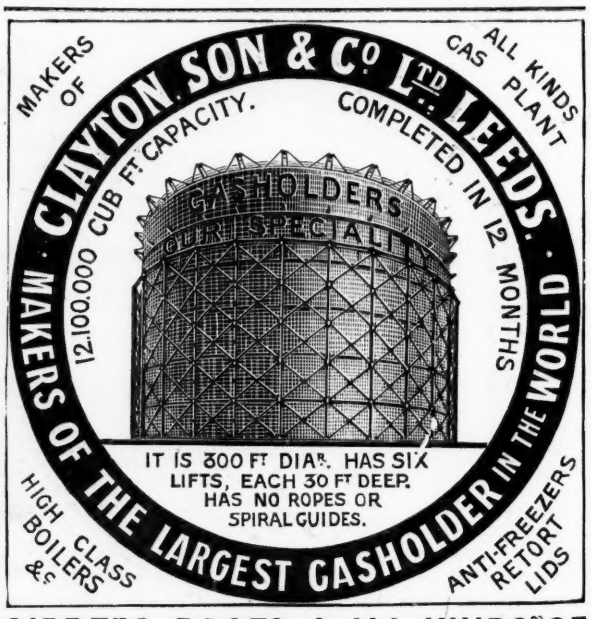
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BURY.
BRIGHOUSE.
MARKET HARBRO'
PRESCOT.
SOWERBY BRIDGE.
LEICESTER.
DARWEN.
NELSON.
ORMSKIRK.
CHORLEY.
WHITEHAVEN.
CHESTER.
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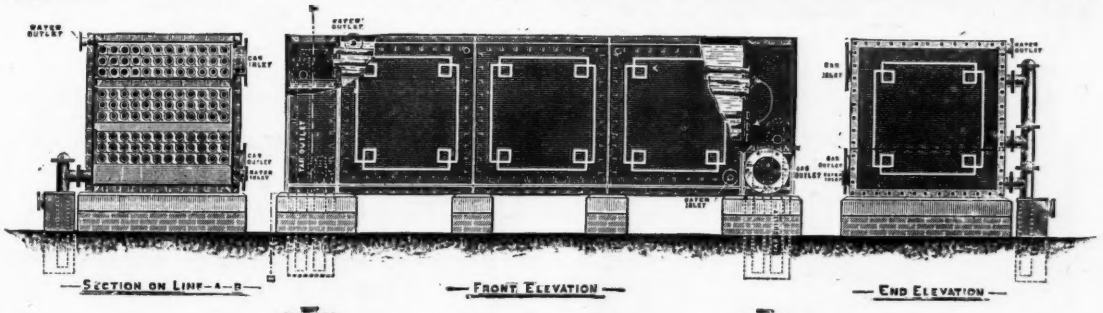

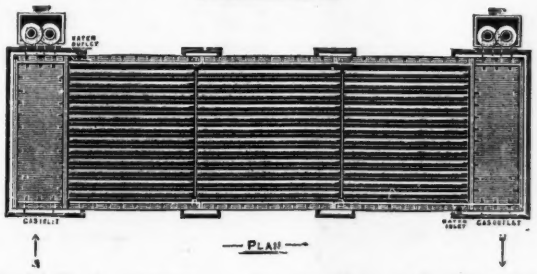

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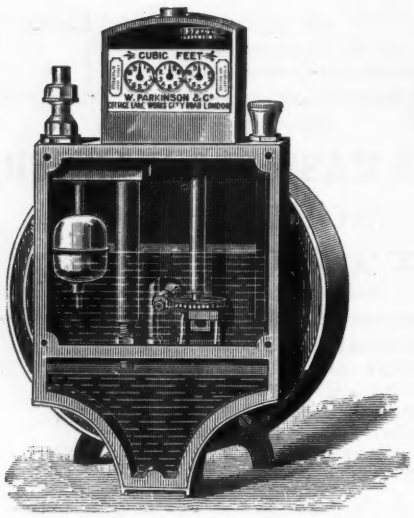

ORDINARY WET METERS

IN CAST-IRON CASES.

Work with very little friction. Will stand very high pressures. Cannot possibly be shut off by sudden increase of pressure, the Float being affected by Outlet Gas only. Allow for loss of water by evaporation without materially affecting the registration or shutting off the gas. Unexcelled for simplicity of construction, excellence of workmanship, or accuracy in registration.

COMPENSATING METERS

IN TINNED OR CAST-IRON CASES.

The Slow-Spoon Compensator has been in extensive use for many years; it maintains an unvarying water-line without appreciable friction, and provides a large reserve of water. The Float arrangement allows sudden or excessive pressure on the Inlet without affecting the working of the Meter or extinguishing the Lights.

DRY METERS.

These Meters are unsurpassed for accuracy of registration. The cases are made of the best Charcoal Tin Plates; and each part of the Meter is stamped by special Machinery to ensure uniformity and exactness in construction. The Diaphragms are all of the best Persian Sheep Skins, carefully selected, and the brasswork and smaller fittings are of superior workmanship.

COTTAGE LANE WORKS, CITY ROAD,
LONDON.
Telegraphic Address: "INDEX."

BELL BARN ROAD WORKS,
BIRMINGHAM.
Telegraphic Address: "GAS-METERS."

[See also Advt. p. 70.

LONDON: Printed by WALTER KING (at the Office of King, Sell, and Railton, Ltd., 12, Gough Square); and published by him at 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, Jan. 11, 1898.